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Blow flies (Diptera: Calliphoridae) of eastern Canada with a key to Calliphoridae subfamilies and genera of eastern North America, and a key to the eastern Canadian species of Calliphorinae, Luciliinae and Chrysomyiinae.

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Abstract The North American subfamilies and eastern North American genera of Calliphoridae, as well as the 21 species of blow flies (other than species of the parasitic genus *Protocalliphora*) now known from, or likely to occur in, eastern Canada, are keyed. *Calliphora loewi* and *Lucilia coeruleiviridis* are formally recorded from Canada or eastern Canada for the first time and distribution maps are derived from the University of Guelph Insect Collection database.



Calliphora vicina Photo by S.A. Marshall

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Table of contents

doi: 10.3752/cjai.2011.11

Checklist of eastern Canadian Blowflies (Calliphoridae subfamilies Chrysomyinae, Luciliinae and Calliphorinae)

Chrysomyinae

Chrysomya rufifacies (Macquart)
Cochliomyia macellaria (Fabricius)
Phormia regina (Meigen)
Protocalliphora spp.
Protophormia atriceps (Zetterstedt)
Protophormia terraenovae (Robineau-Desvoidy)
Trypocalliphora braueri (Hendel)

Calliphorinae

Calliphora genarum (Zett.)
Calliphora livida Hall
Calliphora loewi Enderlein
Calliphora montana (Shannon)
Calliphora stelviana (Brauer & Bergenstamm)
Calliphora terraenovae Macquart
Calliphora vicina R-D
Calliphora vomitoria (L.)
Cynomya cadaverina R-D
Cynomya mortuorum (L.)

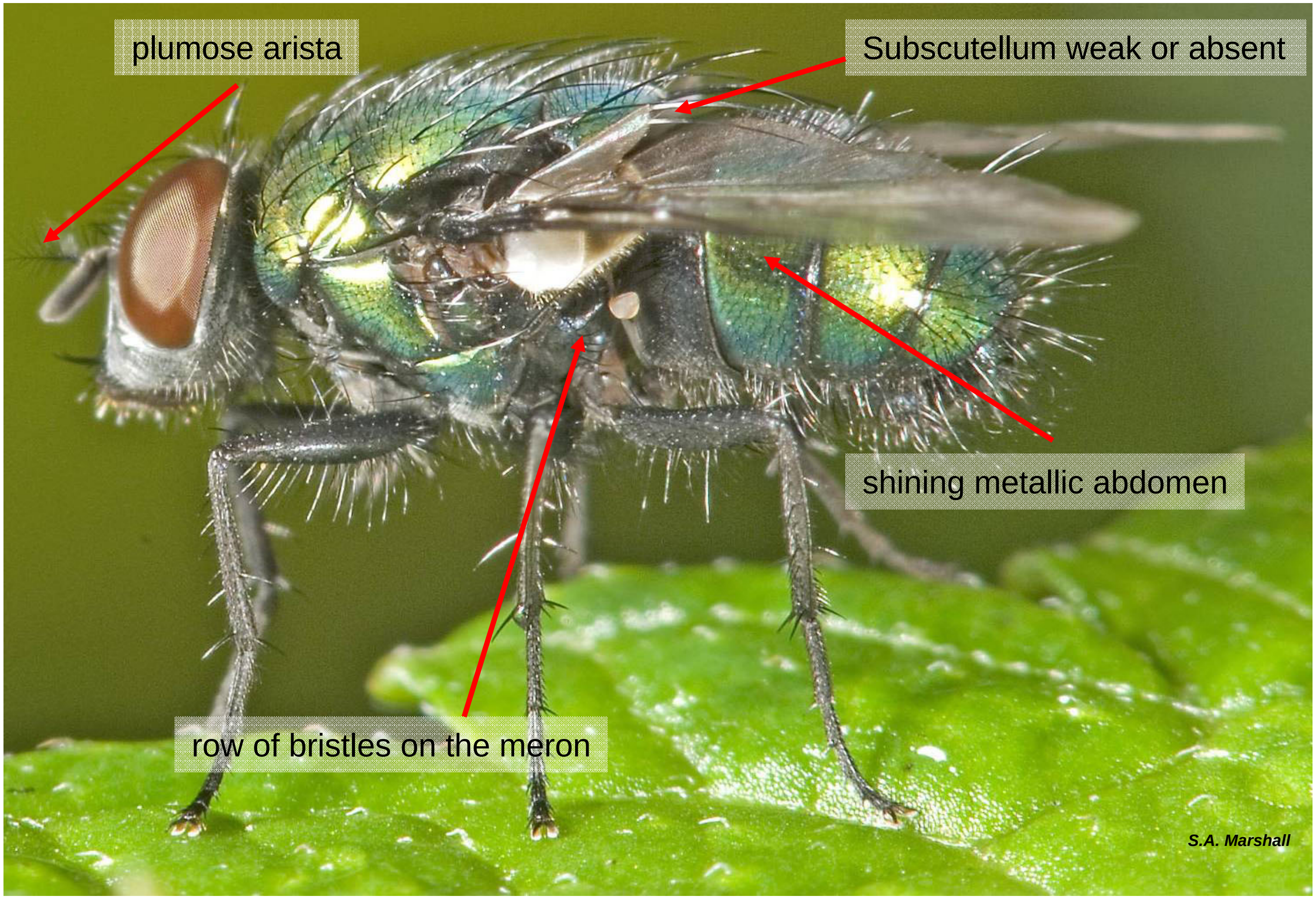
Luciliinae

Lucilia coeruleiviridis Macquart
Lucilia illustris (Meigen)
Lucilia magnicornis (Siebke)
Lucilia sericata **(***Meigen)*
Lucilia silvarum (Meigen)

doi: 10.3752/cjai.2011.11

Distinguishing blow flies from similar Diptera

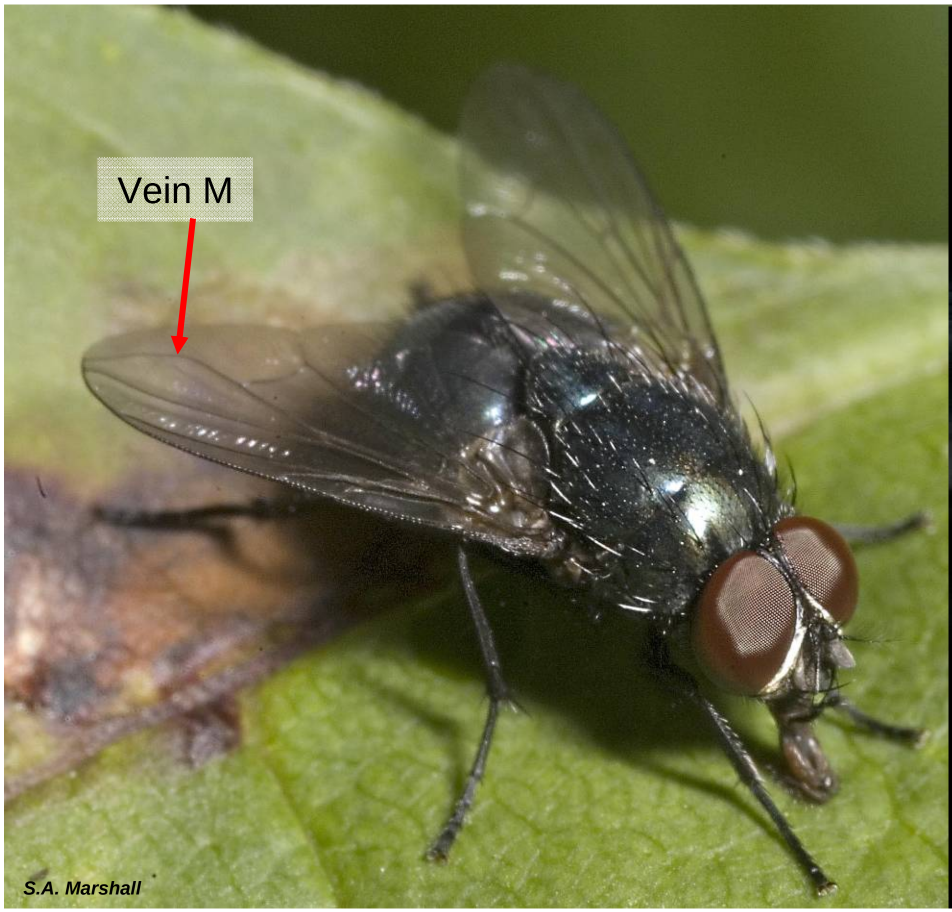
Blow flies (Calliphoridae in the subfamilies Chrysomyinae, Calliphorinae and Lucillinae) are distinguished from other metallic or partly metallic calyptrate Diptera by the row of bristles on the meron and the absence of a prominent subscutellum. The plumose (hairy) arista and sharply bent wing vein M are also characteristic of blow flies, although some uncommon, non-metallic species in the small Calliphoridae subfamily Melanomyinae have a bare arista. The families most easily confused with blow flies in North America are Tachinidae and Muscidae, although Sarcophagidae (gray and black striped, not metallic) also have a row of bristles on the meron.

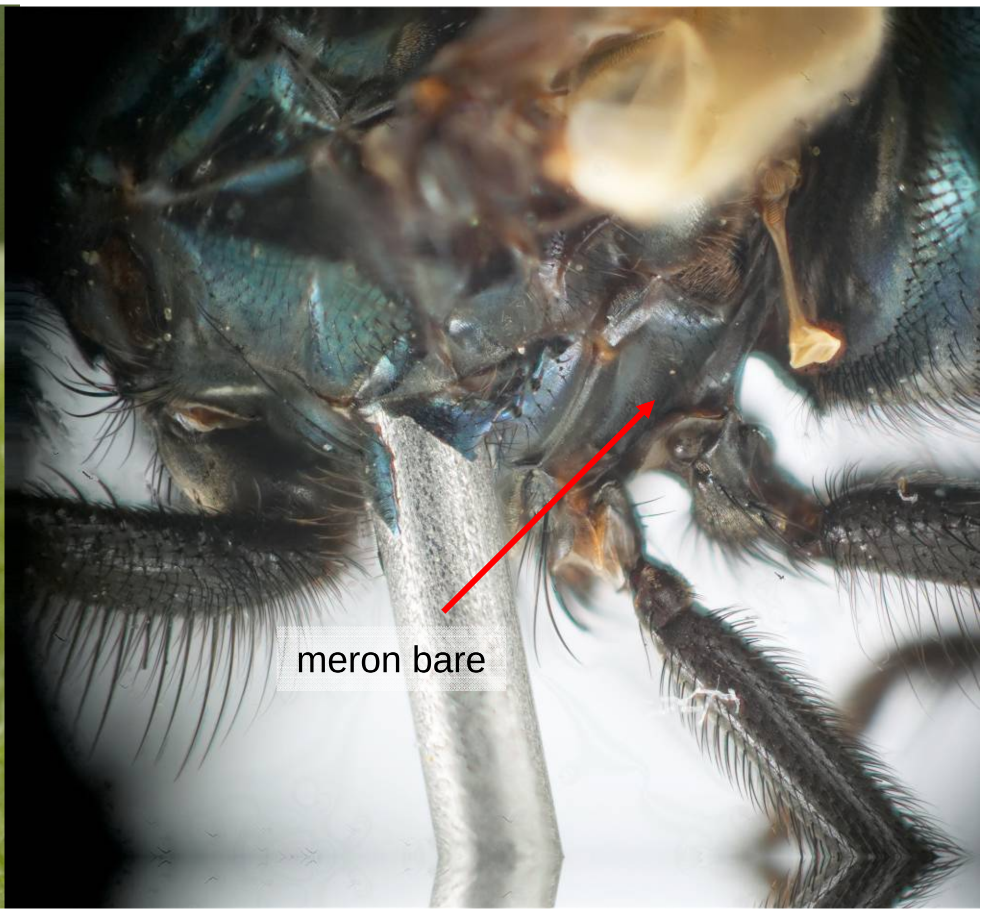


DISTINGUISHING METALLIC MUSCIDAE FROM CALLIPHORIDAE

Muscidae never have a row of stout bristles on the meron (Calliphoridae, Tachinidae, and Sarcophagidae always have a prominent row of meral bristles).

Metallic Muscidae normally have a gentle bend in vein M (this bend is sharply bent in all eastern Canadian Calliphoridae although blow flies in the genus *Bellardia,* an introduced genus known from a few records in the eastern United States, have a weakly bent vein M).





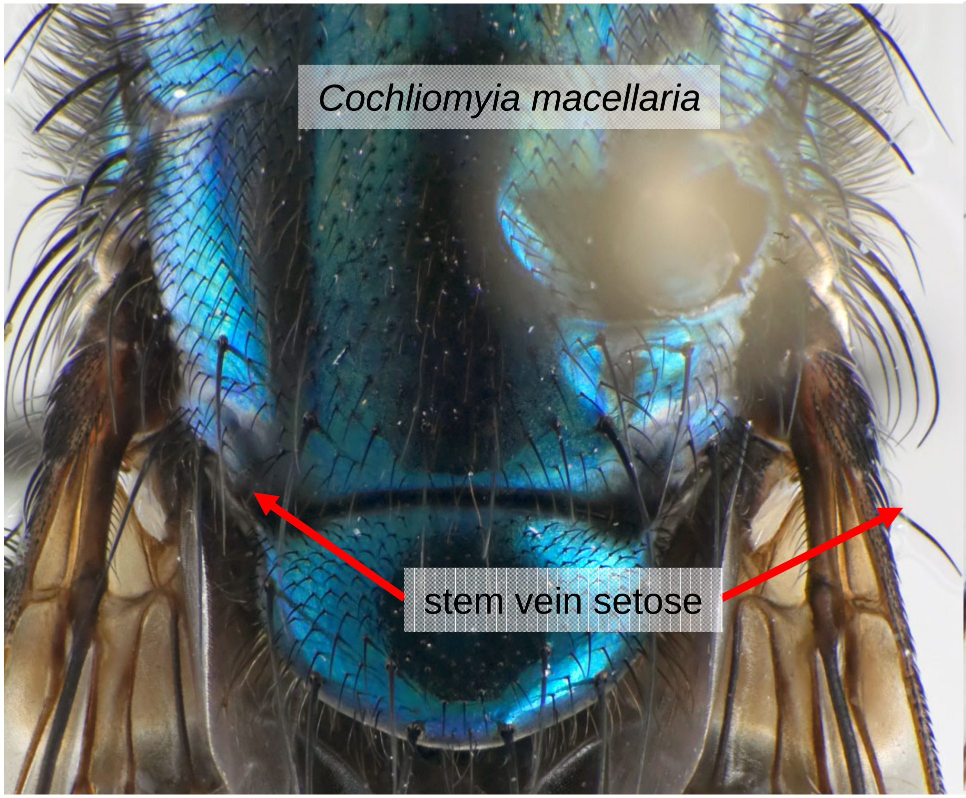
Distinguishing Tachinidae from Calliphoridae

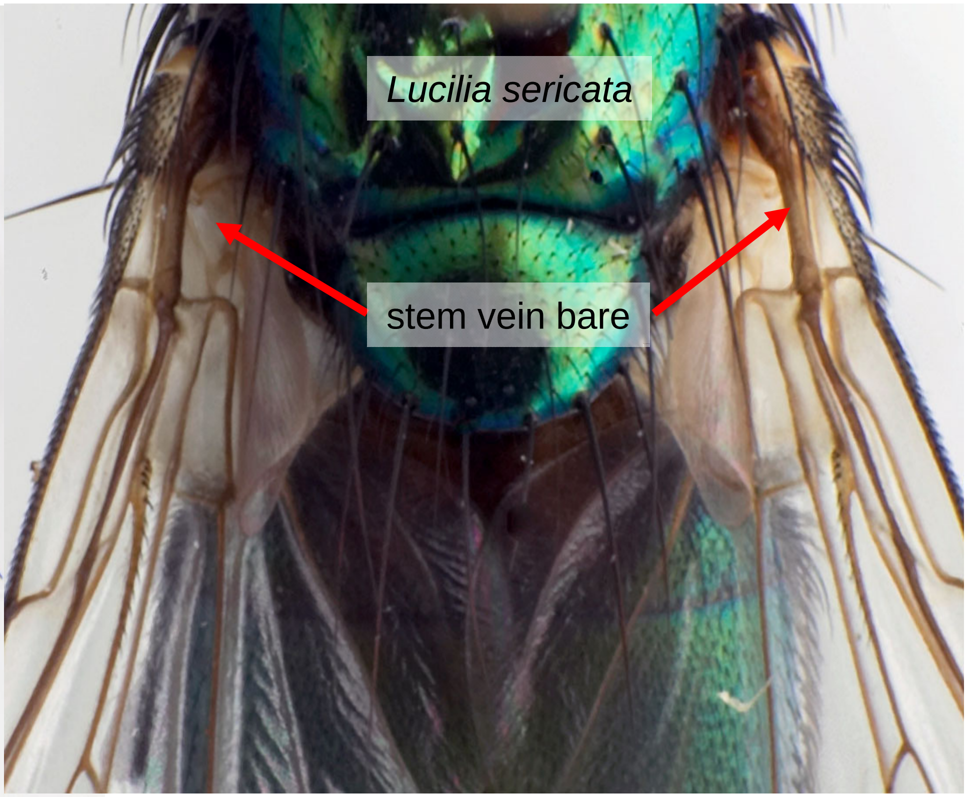




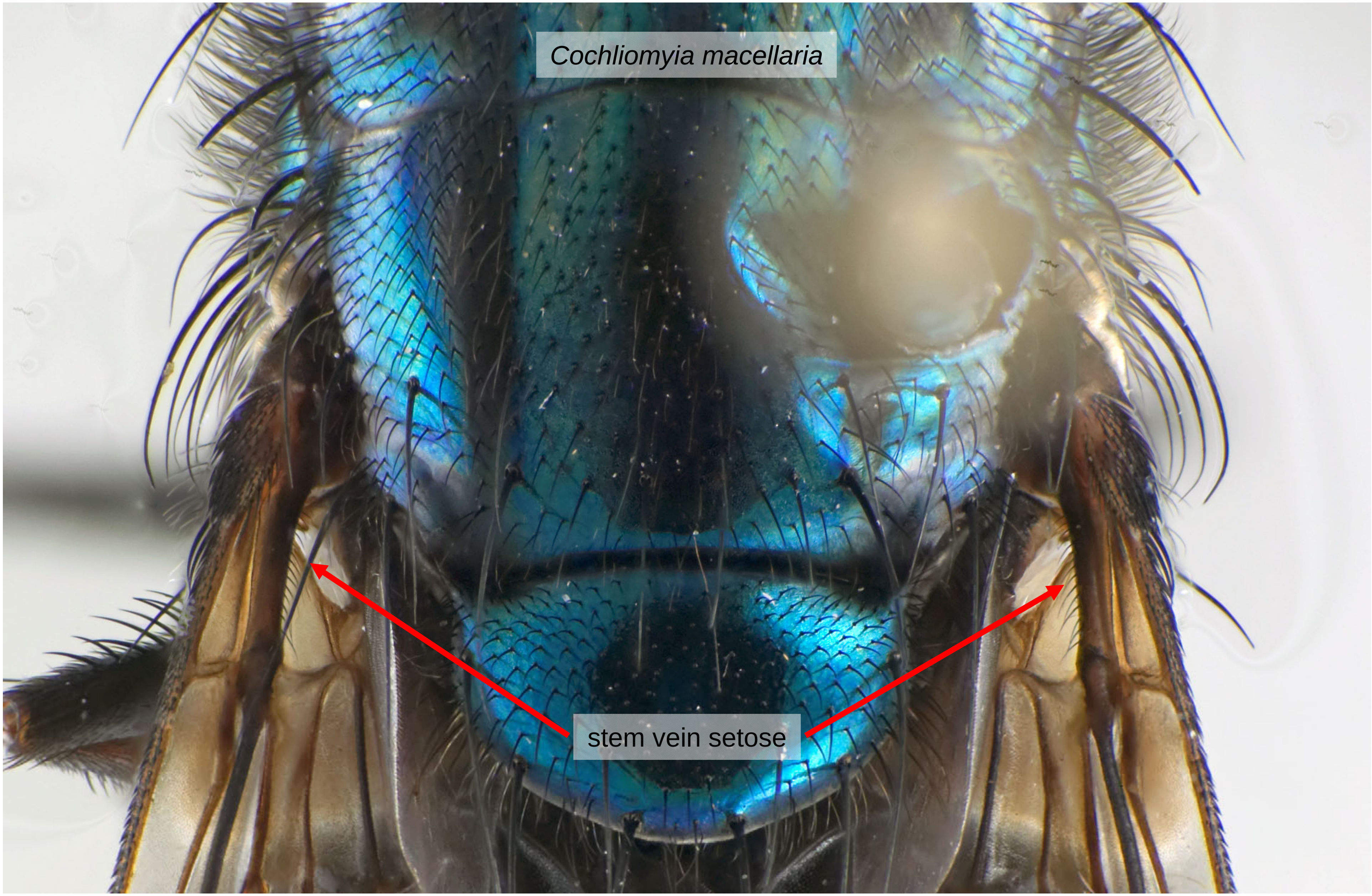
TACHINIDAE: Always characterized by a prominent subscutellum. Metallic species normally have a bare arista.

KEY TO THE SUBFAMILIES AND GENERA OF CALLIPHORIDAE

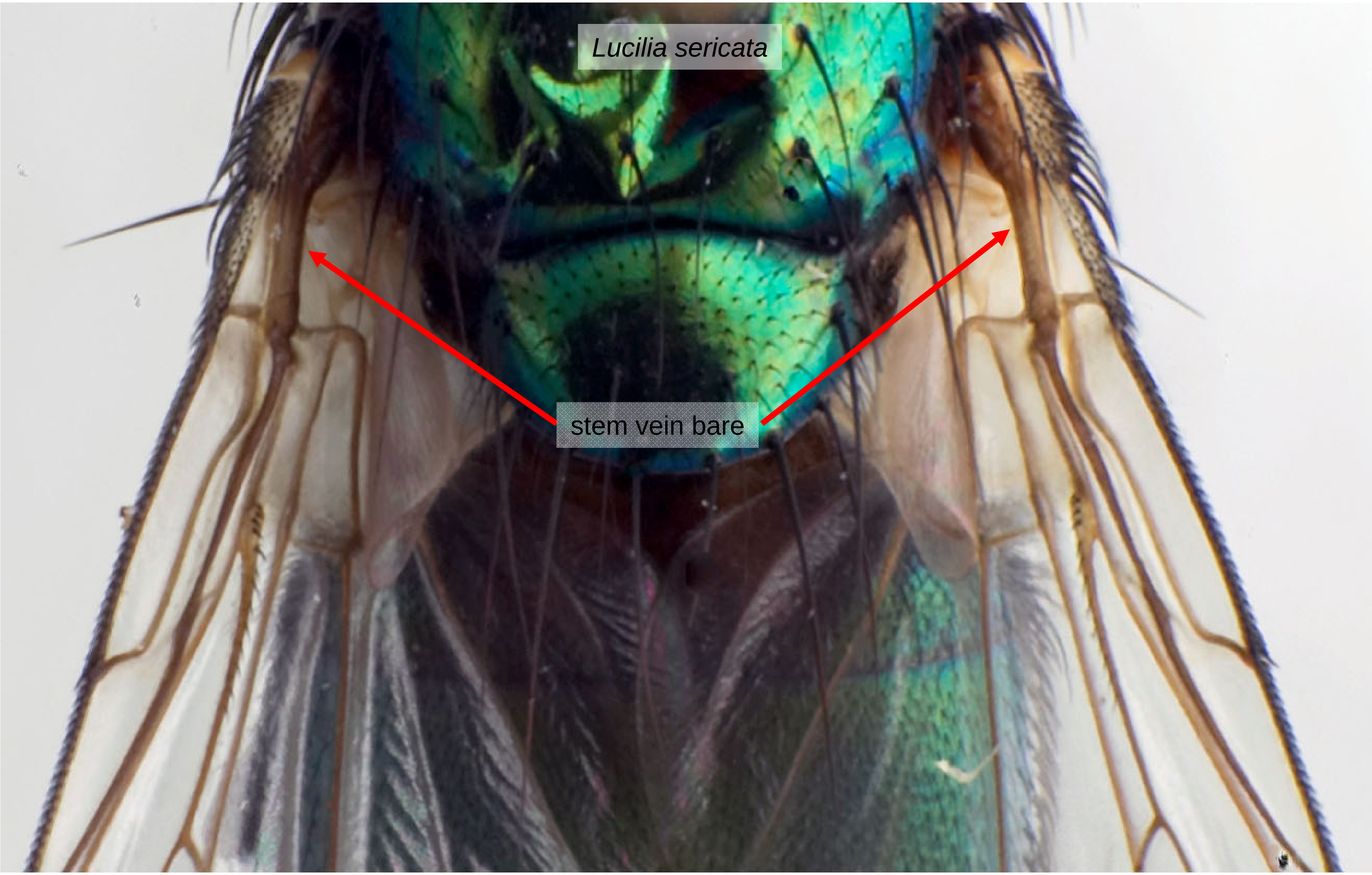




1	Stem vein with bristles on the dorsal surface. Metallic flies with wings often (but not always) held almost parallel to the body.	Chrysomyinae
-	Stem vein bare. If metallic, then wings usually held out at an angle from the body.	2



Return to key



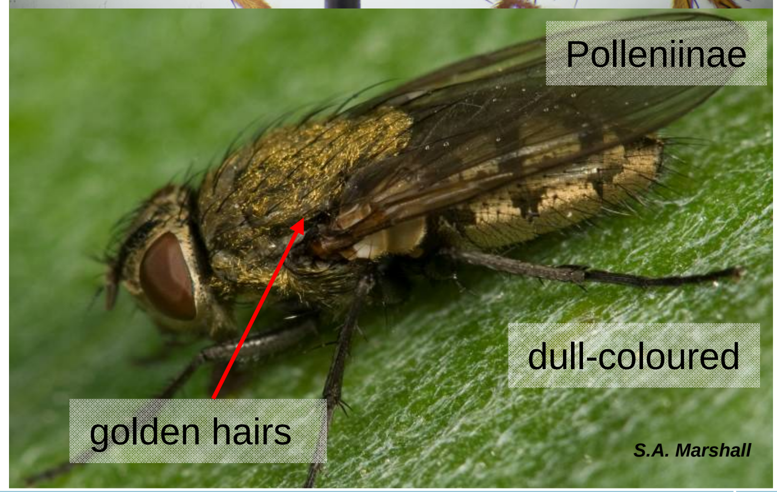
Return to key

KEY TO THE SUBFAMILIES OF CALLIPHORIDAE









2 (1)	Abdomen and/or thorax metallic, with colours varying from green to purple, blue, or bronze. Neither thorax nor abdomen with golden hairs. (Luciliinae and Calliphorinae)	3
-	Abdomen and thorax dull-colored, usually covered with crinkly golden hairs (Polleniinae, common) or without golden hairs (Melanomyinae, rarely collected).	4

KEY TO THE SUBFAMILIES OF CALLIPHORIDAE





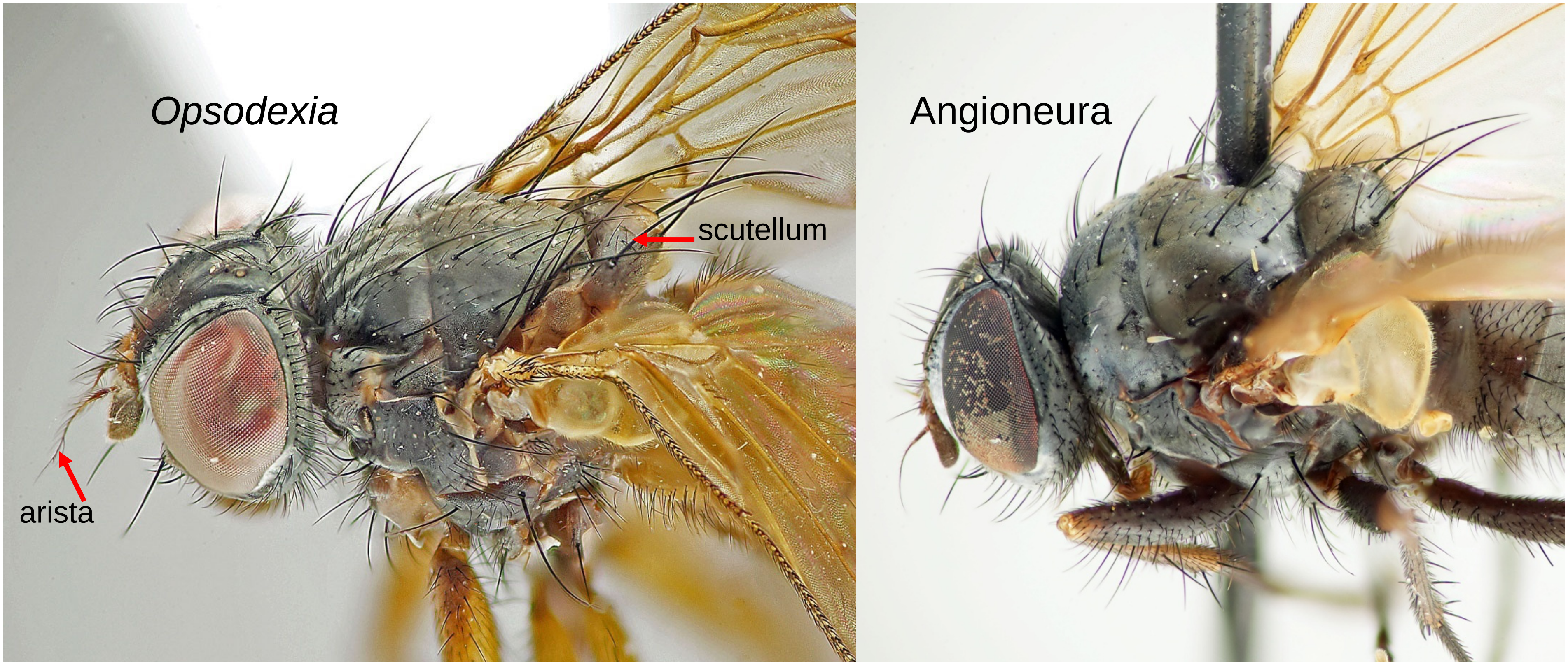
3 (2)	Thorax and abdomen brightly metallic. Color green, blue, or bronze (color varies within species).	Luciliinae
-	Abdomen metallic blue, purple, or green; sometimes dulled by microtomentum (microscopic hairs). Thorax appearing dull grey or black, rarely shining.	Calliphorinae





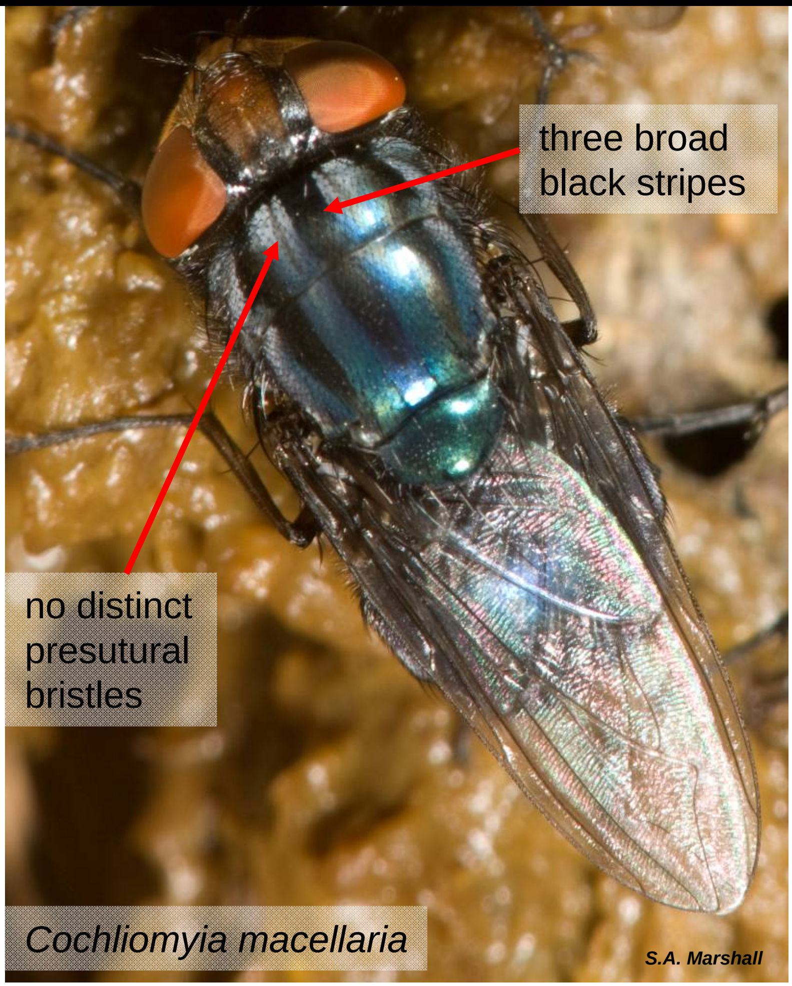
4 (<u>2</u>)	Golden hairs present on the sides and dorsum of the thorax. Golden hairs may vary in degrees of thickness, but are always present. ONE VERY COMMON GENUS (*POLLENIA*), NOT COVERED FURTHER IN THIS KEY	Polleniinae *Pollenia* spp CLUSTER FLIES
-	No golden hairs present. TWO UNCOMMON GENERA	<u>Melanomyinae</u>

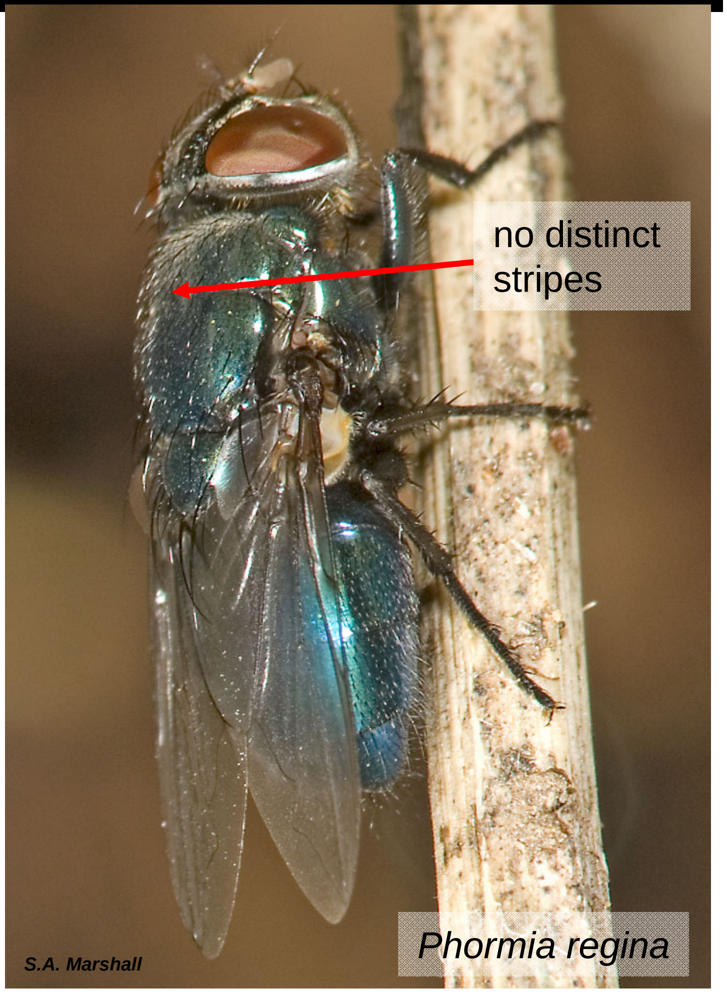
KEY TO THE GENERA OF EASTERN CANADIAN MELANOMYINAE



	Arista plumose. Scutellum with four long equal bristles (apical bristles long).	*Opsodexia*
-	Arista with only short, inconspicuous hairs. Scutellum with two long bristles (apical bristles short).	Angioneura

KEY TO EASTERN CANADIAN SPECIES IN THE SUBFAMILY CHRYSOMYINAE





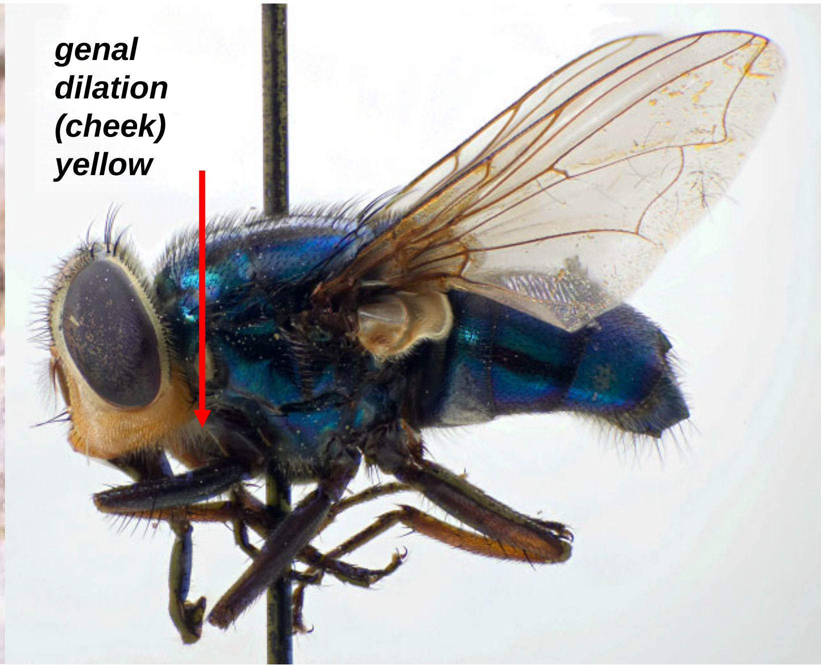
1	Top of thorax (scutum) with three large and distinct black stripes. Cheek (genal dilation) yellow. Presutural dorsocentral and acrostichal bristles short or absent. 1 northeastern species: *C. macellaria* (Fabricius)	*Cochliomyia*
-	Top of thorax uniform in color with no distinct stripes (although indistinct stripes may be present). Cheek (genal dilation) usually black (white in *Chrysomya rufifacies*). If with thoracic stripes (some *Protocalliphora)*, presutural dorsocentral bristles long.	2

Cochliomyia macellaria (Fabricius)

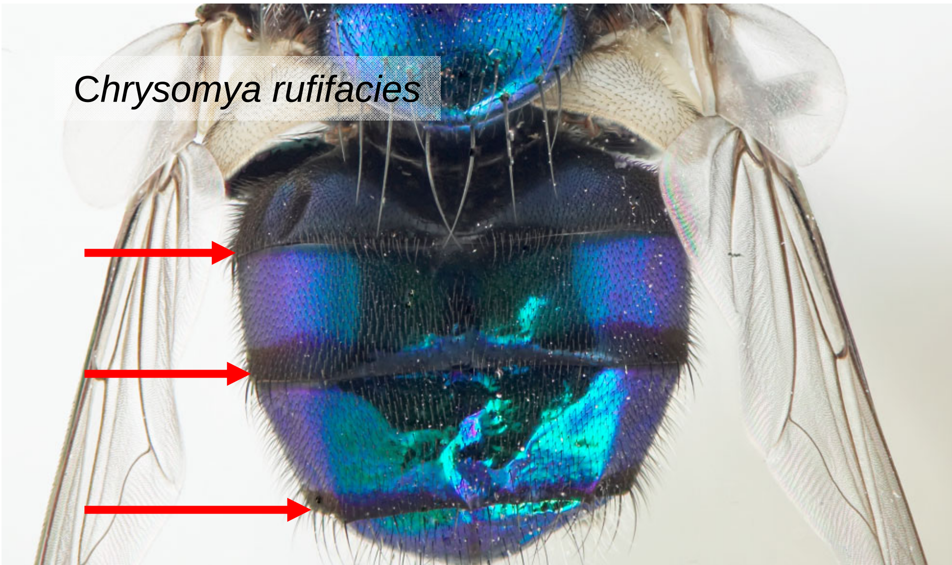


Cochliomyia macellaria, unlike other northeastern blow flies, has three broad black stripes on the scutum. Known as the Secondary Screwworm, this species is widespread in North and South America, and is the only *Cochliomyia* species in northeastern North America. Adults occur throughout the season. Females usually oviposit in carrion, but may deposit eggs in the wounds of live animals causing secondary myiasis as they feed on necrotic tissue.

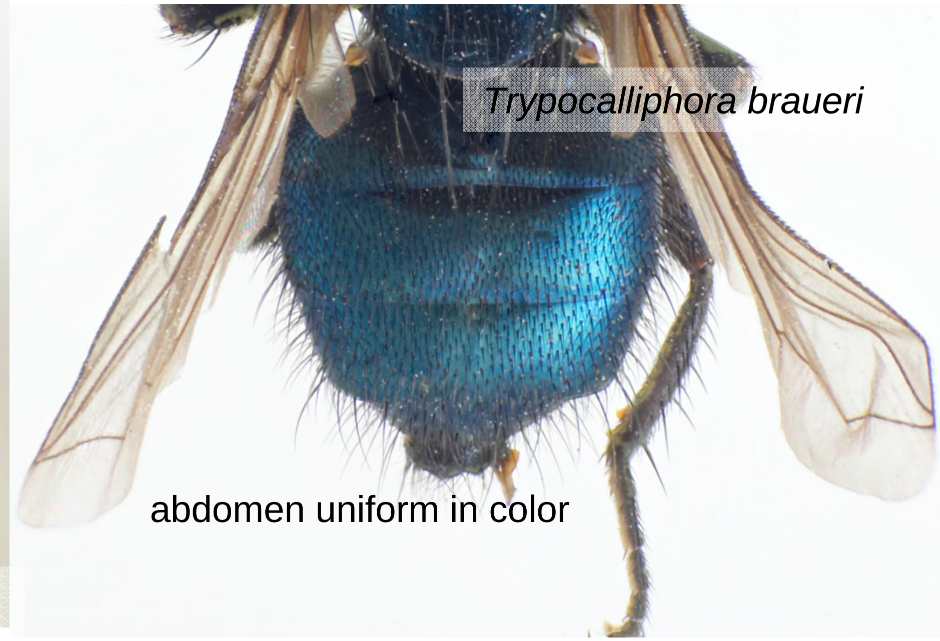




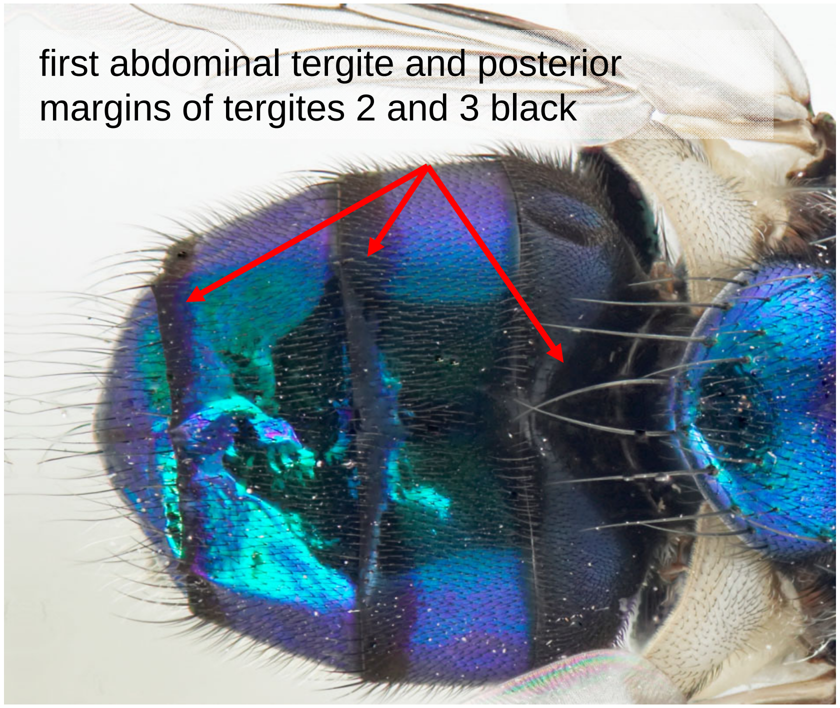
KEY TO THE EASTERN CANADIAN CHRYSOMYINAE

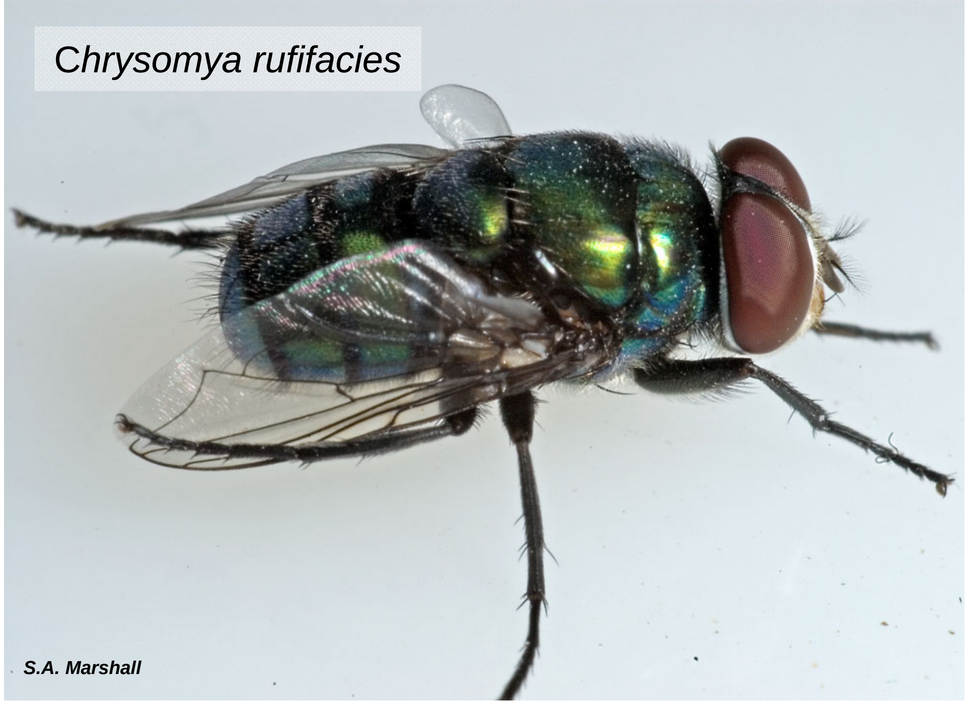


First tergite and posterior margins of second and third tergites black



2 (1)	First abdominal tergite (syntergite 1+2) and posterior margins of tergites 3 and 4 black. Greater ampulla (prominent knob below wing base) with short, erect bristles. Cheek (genal dilation) white. 1 northeastern species, *C. rufifacies* (Macquart).	*Chrysomya*
-	Abdominal segments uniform in color. Greater ampulla bare. Cheek black.	3

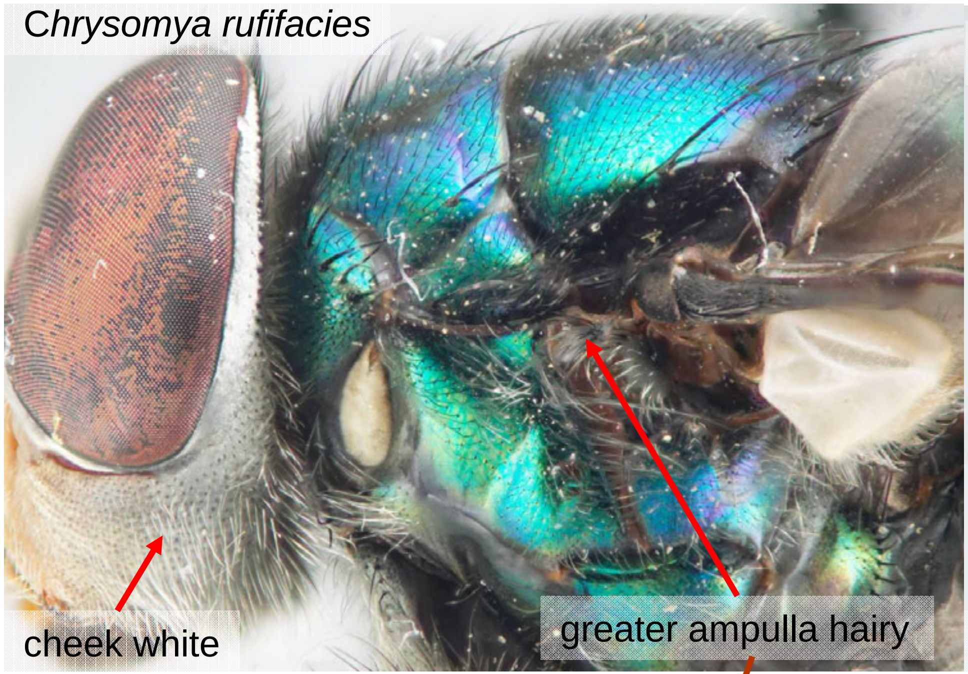


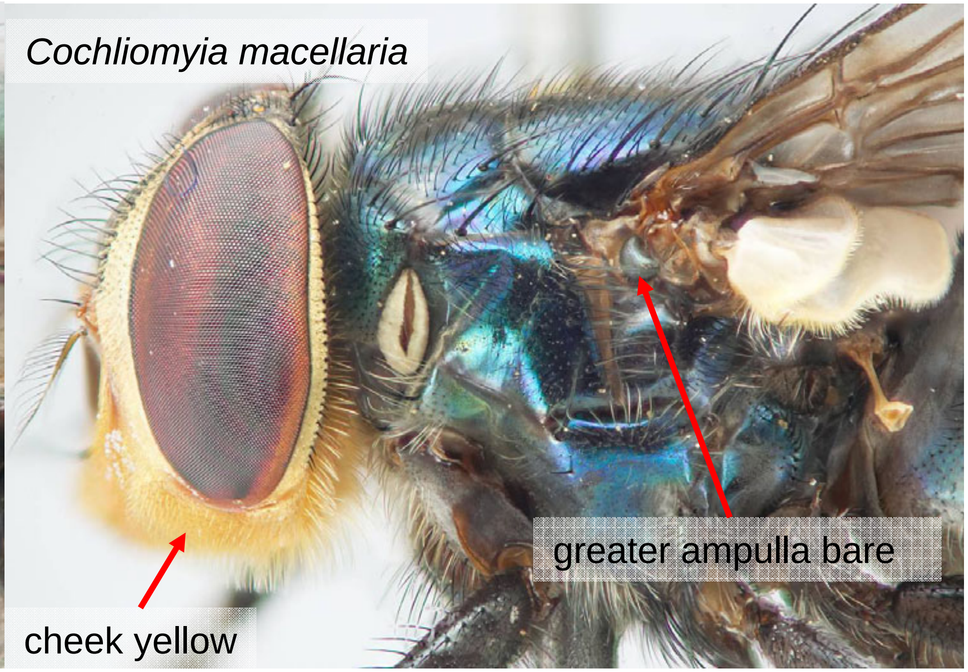


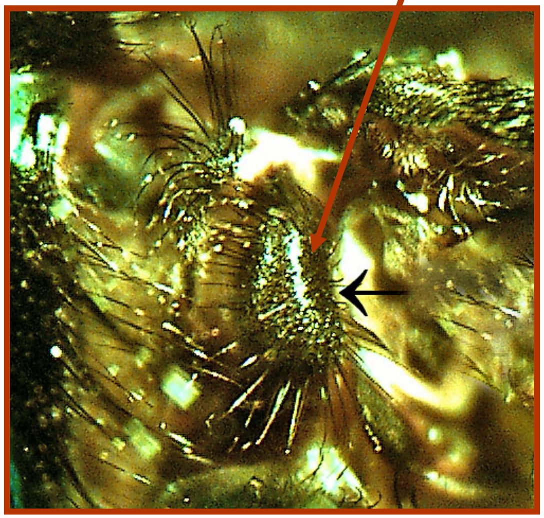
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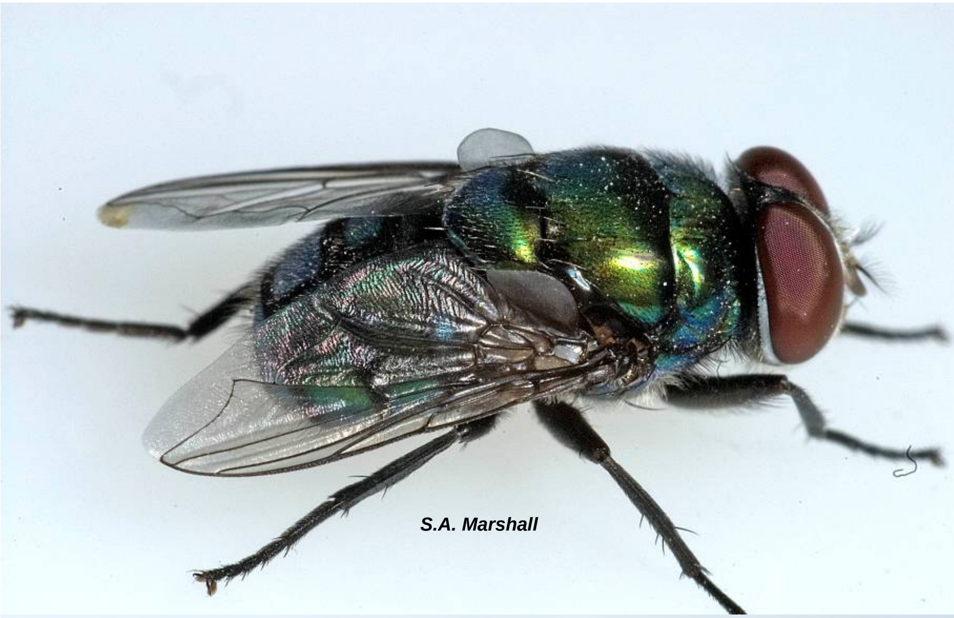






Return to key

Chrysomya rufifacies (Macquart)



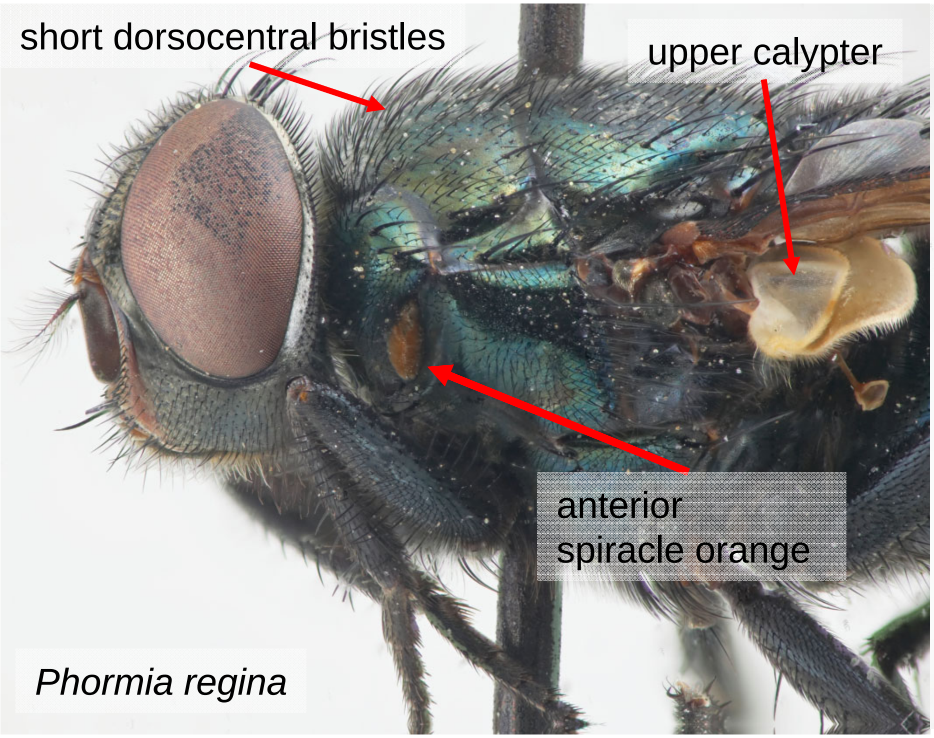
Chrysomya rufifacies (the Hairy Maggot Blow Fly) is native to Australia and Southeast Asia and was first recorded in the United States in 1982, and in Canada in 2007 (Rosati and VanLaerhoven 2007). Adults occur in the summer and early autumn months. Early instar larvae feed on carrion; third instar maggots are predators of other maggots and insect larvae. *Chrysomya rufifacies* remains uncommon in Canada, where it is only known from extreme southern Ontario.

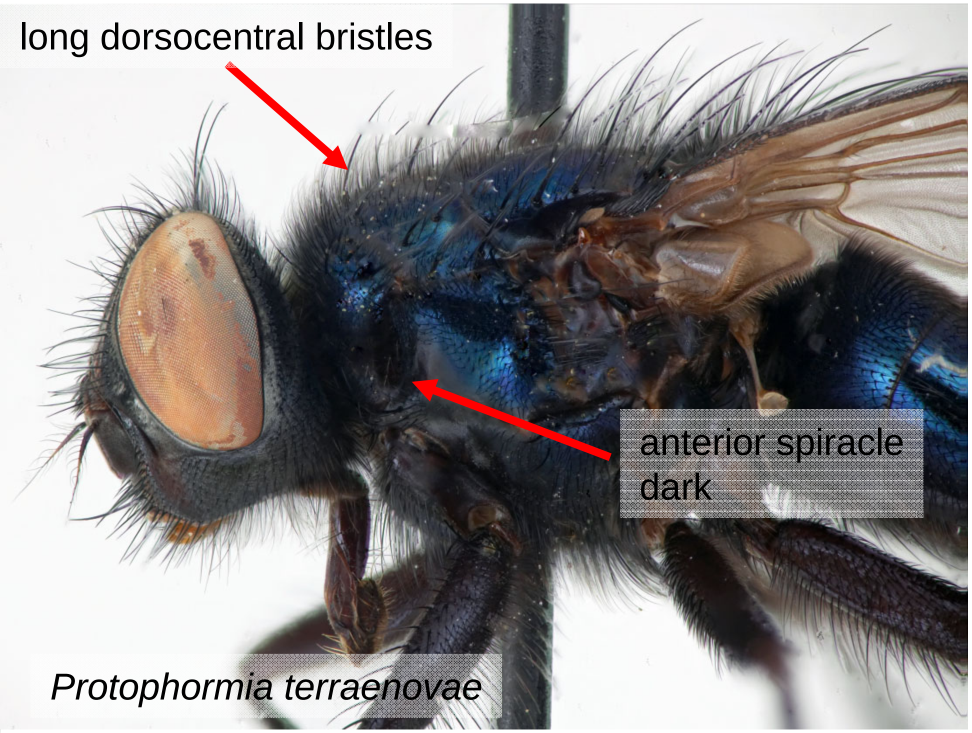




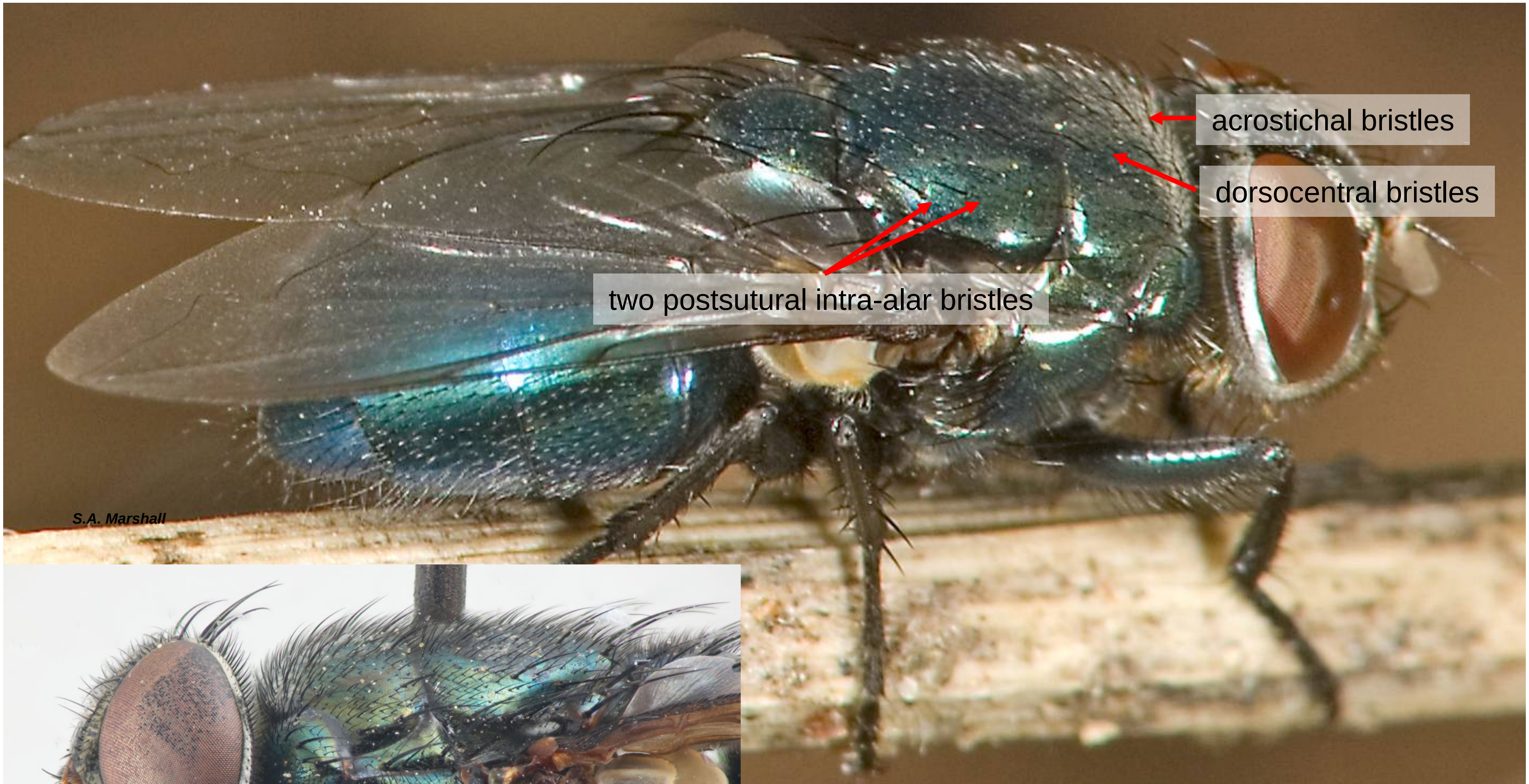
Return to key

KEY TO THE EASTERN CANADIAN CHRYSOMYINAE





3 (2)	Anterior thoracic spiracle covered in fine orange bristles. Bristles on top of thorax relatively short (presutural dorsocentral and presutural acrostichal bristles short but distinct). Upper calypter with only fine white hairs. Two postsutural intra-alar bristles. Top of thorax convex. 1 species, *P. regina* (Meigen).	*Phormia*
-	Anterior thoracic spiracle usually dark, never orange but sometimes brown in parasitic species with three or more postsutural acrostichal bristles. Bristles of thorax relatively long: presutural dorsocentral bristles long, presutural acrostichal bristles indistinct (*Protophormia*) or long. Upper calypter with dark hairs (*Protophormia)* or bare or with fine white hairs. Two (*Protophormia*) or more postsutural intra-alar bristles. Top of thorax relatively flat.	4

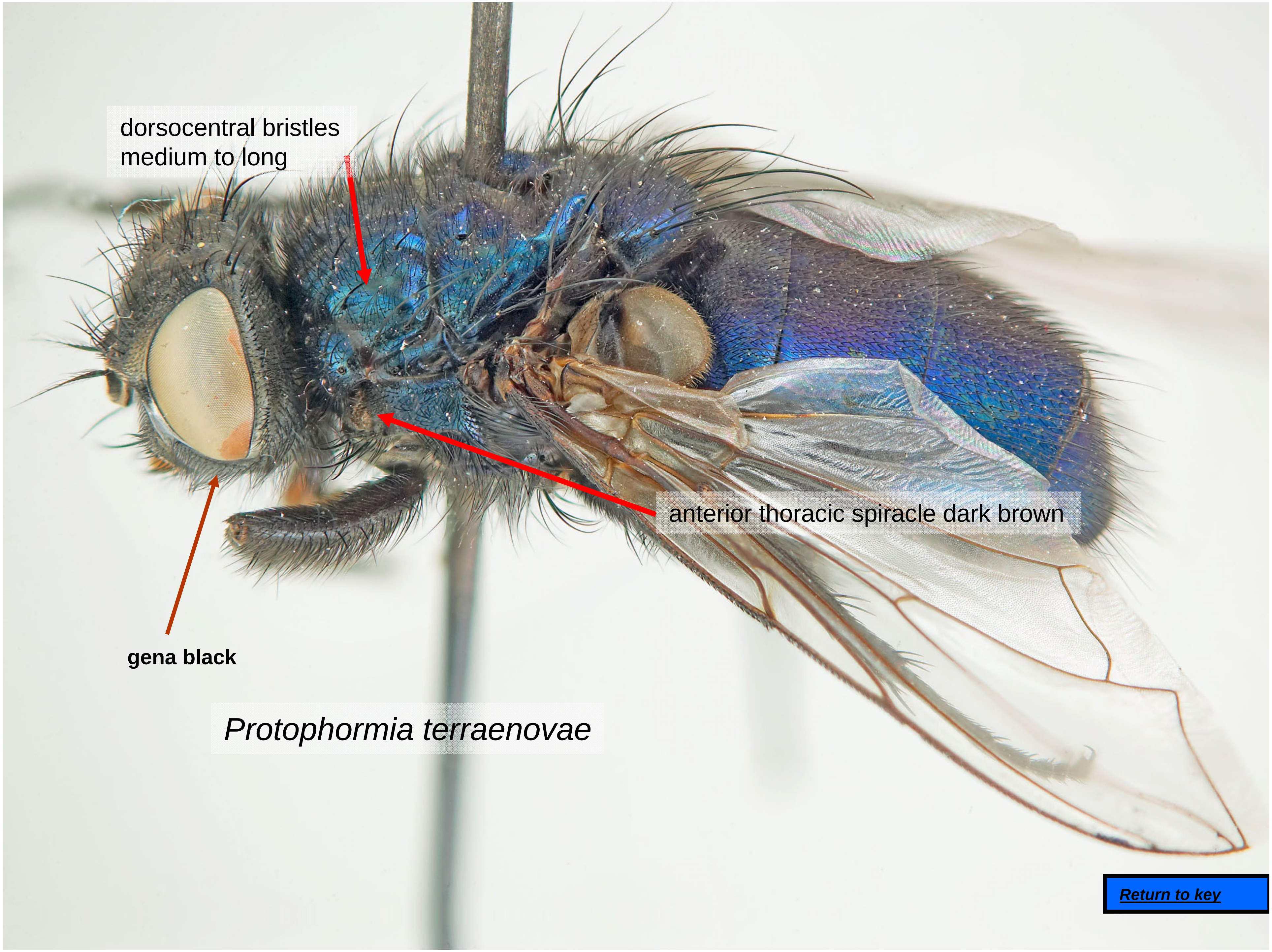




Phormia regina

acrostichal and dorsocentral bristles short but distinct

Return to key


dorsocentral bristles medium to long
anterior thoracic spiracle dark brown
gena black
Protophormia terraenovae
Return to key

Phormia regina (Meigen)

Go to map



The Black Blow Fly (*Phormia regina),* a metallic species with colors varying from green to blue, overwinters in the adult stage and is most often collected in spring and autumn. This widespread, common, synanthropic species is attracted to both dung and carrion, and can cause secondary myiasis in animals, and is a pest in the livestock industry. The flies illustrated to the left were amongst hundreds attracted to a stinkhorn fungus.



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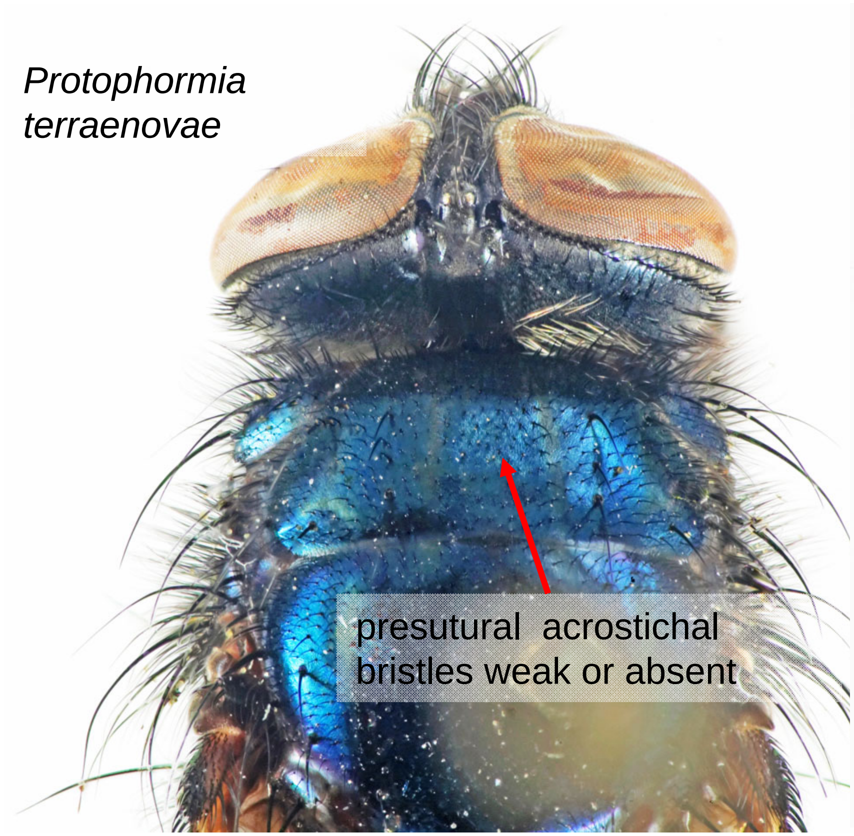
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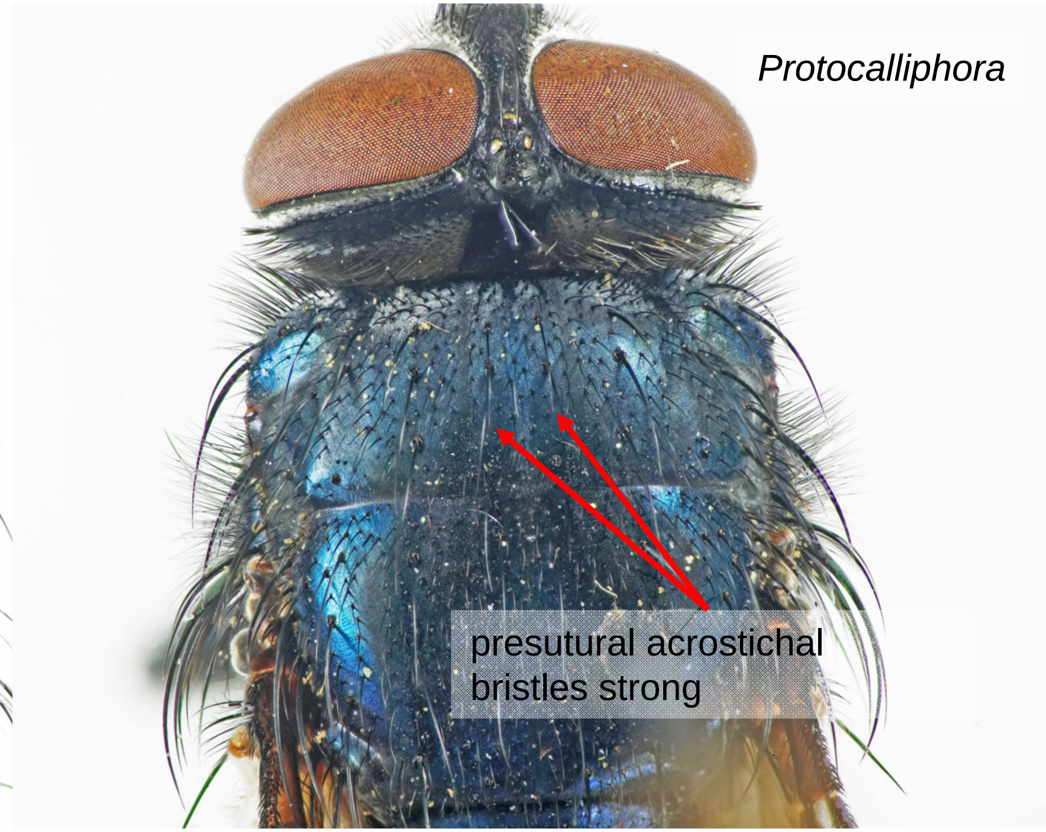
Phormia regina



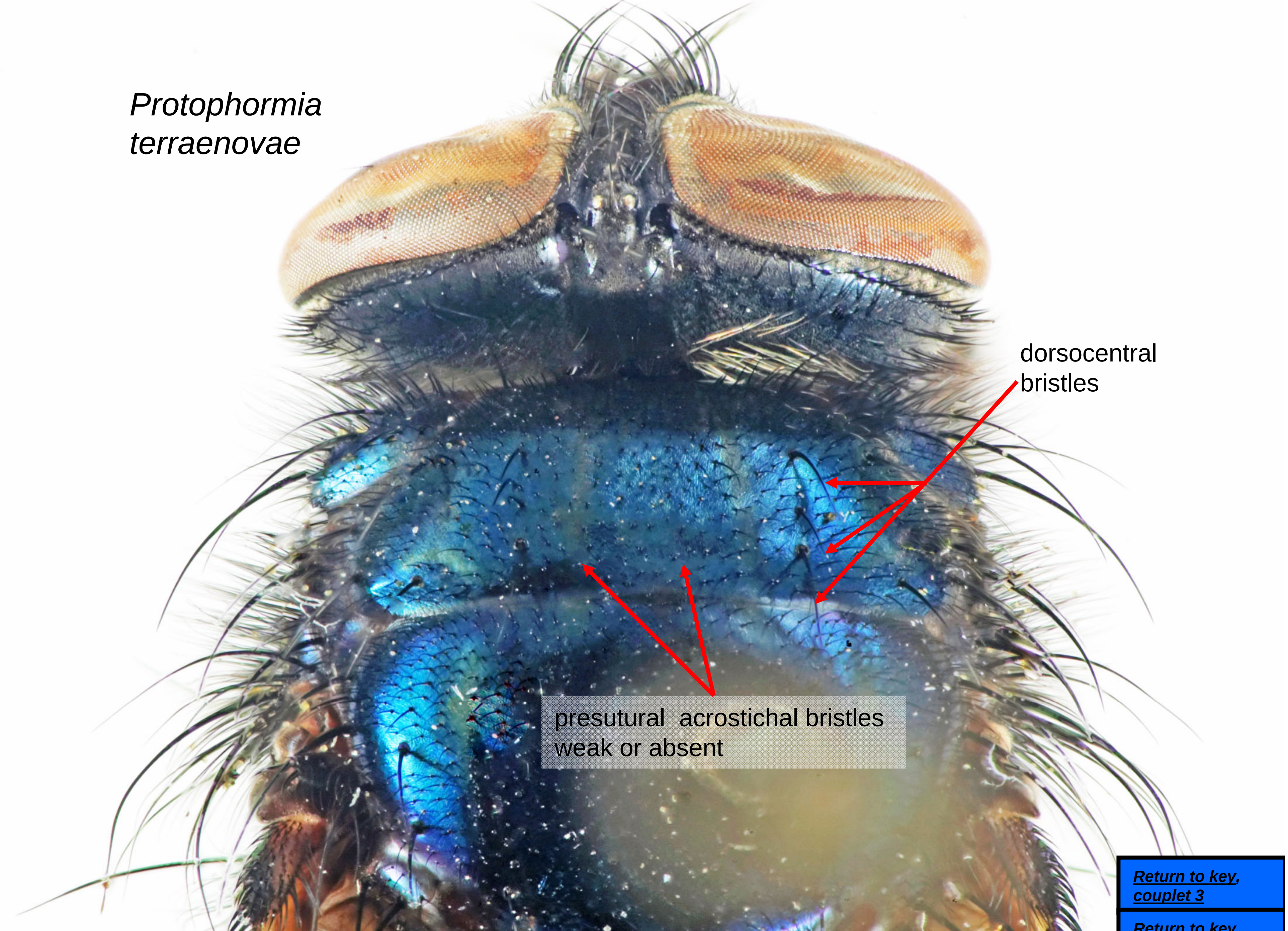
Records from the University of Guelph Insect Collection only

KEY TO THE EASTERN CANADIAN CHRYSOMYINAE





4 (3)	Presutural acrostichal bristles weak. Upper calypter with long brown or black hairs. Body without whitish bloom. Scavenger species typically found around carrion. 1 widespread holarctic species, *P. terraenovae* (Robineau-Desvoidy) found across Canada, and one rare arctic/subarctic species, *P. atriceps* (Zett.).	*Protophormia*
-	Presutural acrostichal bristles strong, distinct. Upper calypter with only fine white hairs. Body with a whitish bloom over metallic background. Larvae are parasites of various bird nestlings and adults are not typically found around carrion.	5



[Return to key, couplet 3](#)
[Return to key, couplet 4](#)



Return to key, couplet 3
Return to key, couplet 4

KEY TO THE EASTERN CANADIAN PROTOPHORMIA

Protophormia terraenovae



Protophormia atriceps



1	Arista plumose, with long hairs above and below although those on lower side shorter. Anterior spiracle not conspicuously enlarged, smaller than postpronotal lobe (humerus). Lower part of face not protruding. Apices of veins R_{4+5} and M widely separated. Widespread.	*Protophormia terraenovae*
-	Arista with long hairs above but almost bare below. Anterior spiracle conspicuously enlarged, larger than postpronotal lobe (humerus). Lower part of face protruding. Apices of veins R_{4+5} and M close or contiguous. A northern species, recorded from northern Quebec.	*Protophormia atriceps*



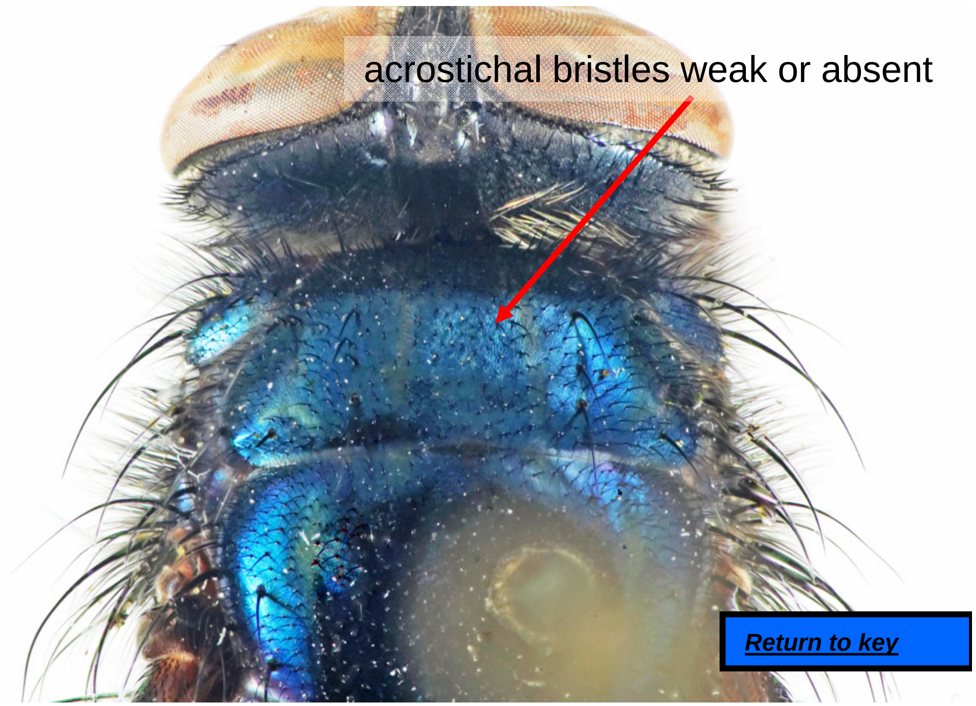


[Return to key](#)

Protophormia terraenovae (Robineau-Desvoidy)



This dark metallic blue species can be distinguished from the similar *Phormia regina* by its **longer dorsocentral bristles.** It differs from both *Phormia* and *Protocalliphora* species in that **acrostichal bristles are weak or absent.** *Protophormia terraenovae occurs across Canada* but it is generally much less common than *Phormia regina*. The only other *Protophormia* in our region, the northern holarctic *P. atriceps* occurs in subarctic and arctic Canada.



Go to map

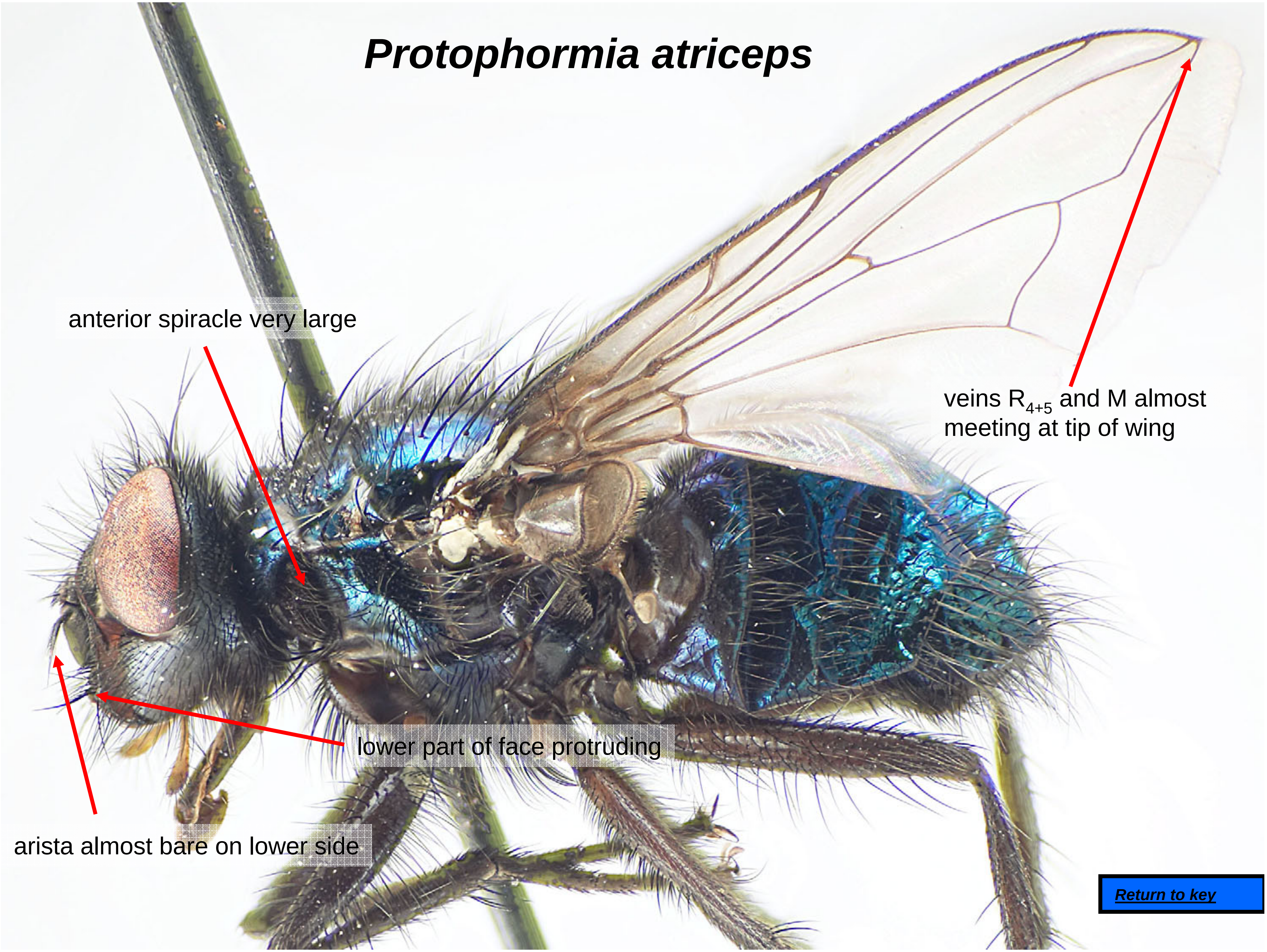
Return to key

Protophormia terraenovae



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Protophormia atriceps



Go to map

Protophormia atriceps (Zetterstedt)



Protophormia atriceps is a northern Holarctic species rarely collected in North America, where it is only known from the far north (north of 80 º). Most North American records are from the west but the species has been recorded from far northern Quebec.

Return to key

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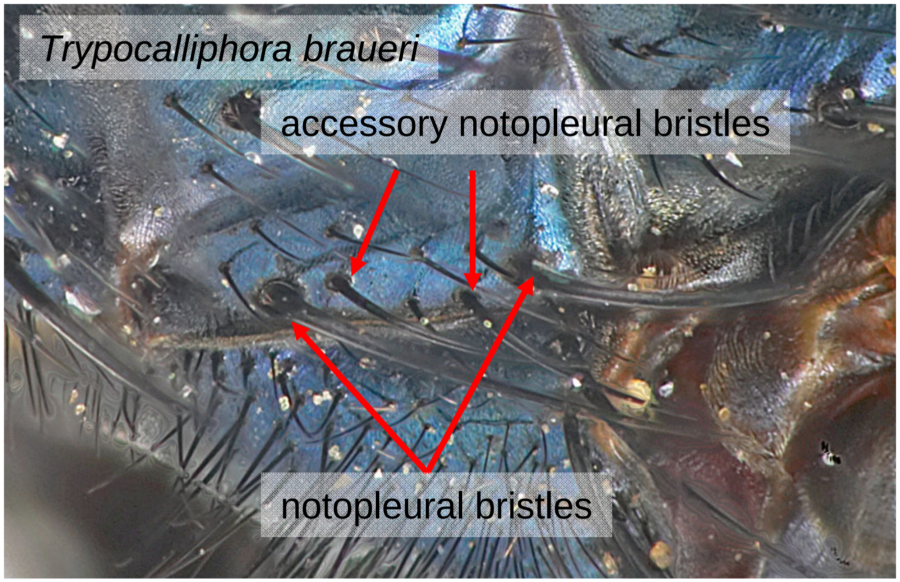
Protophormia atriceps

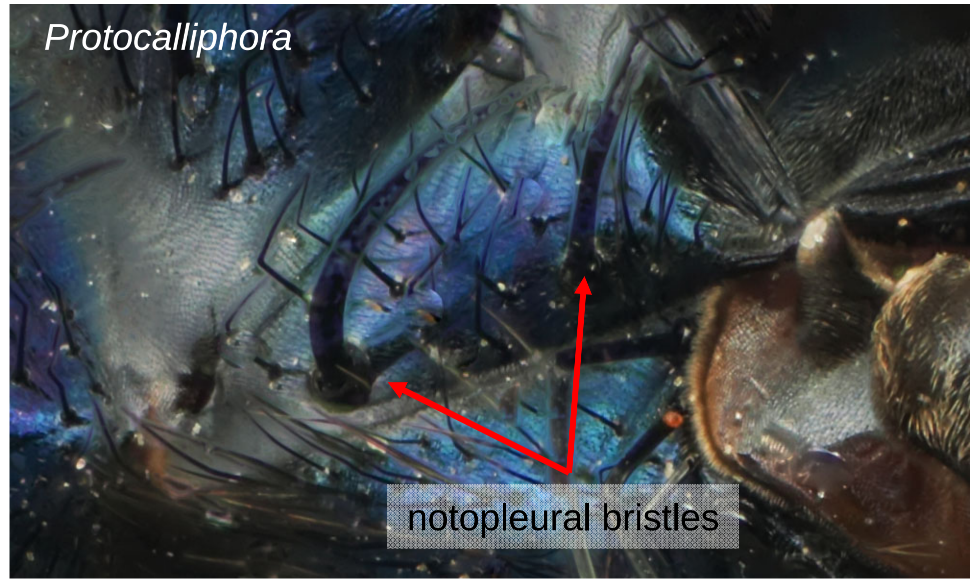


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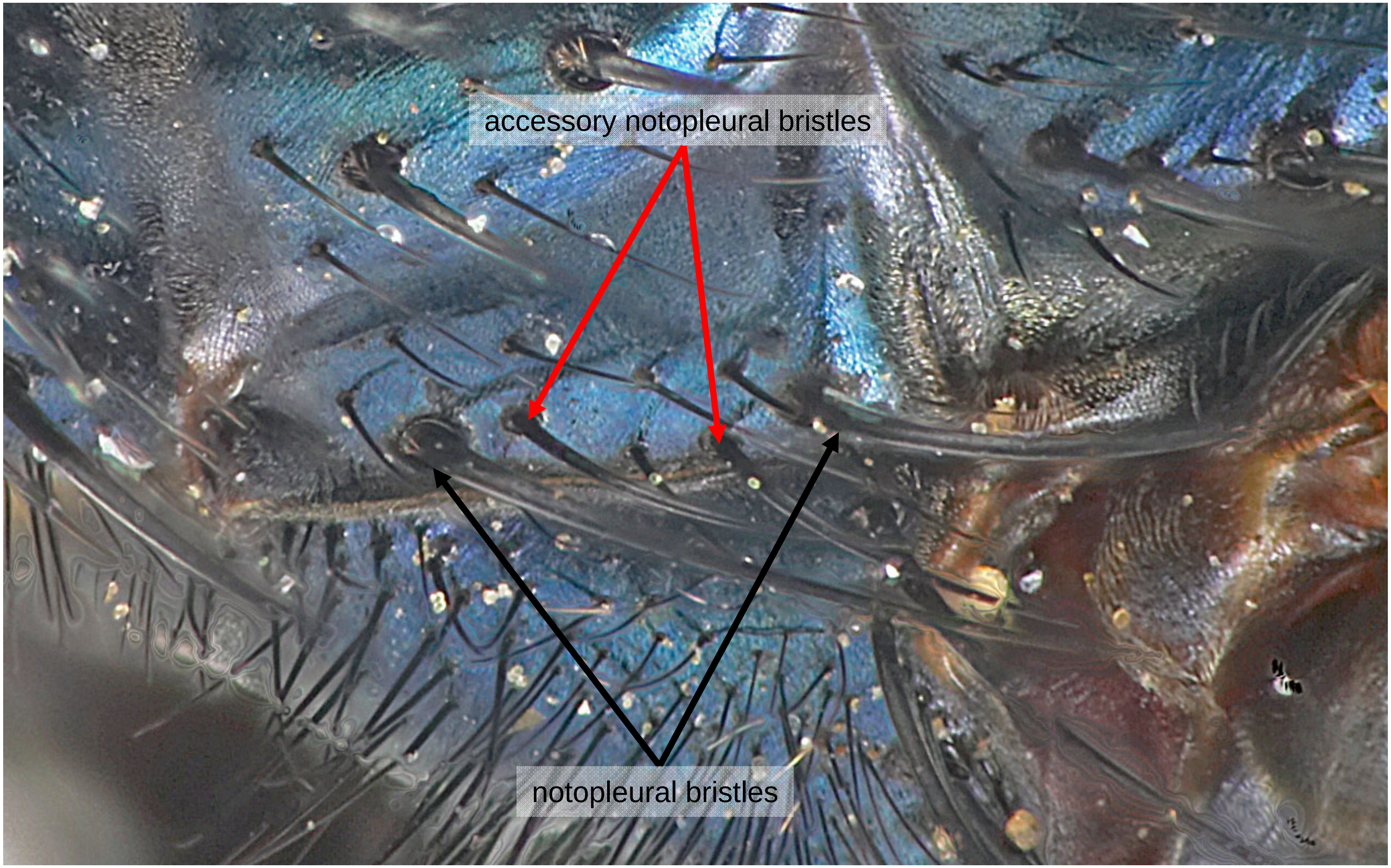
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KEY TO THE EASTERN CANADIAN CHRYSOMYINAE





5 (4)	One or two accessory notopleural bristles between the usual two bristles on the notopleuron. Calypter yellowish to brown. - 1 species: *T. braueri* (Hendel)	*Trypocalliphora*
-	Notopleuron with the normal complement of two bristles. Calypter usually white. (11 eastern species, lone specimens of some species, especially females, can be difficult to identify – see Whitworth, 2006)	*Protocalliphora*



Notopleuron of *Trypocalliphora braueri*

Return to key


Protocalliphora
two notopleural bristles
Return to key

Trypocalliphora braueri (Hendel)



Trypocalliphora braueri , the only species in the genus, is closely related to, and sometimes treated as part of, the large and difficult genus *Protocalliphora*. Adults of this species (and some *Protocalliphora)* exhibit sexual dimorphism, females are bronze-coloured, while males are bright blue. Larvae are subcutaneous parasites of birds. Females deposit eggs directly on the nestlings, where they hatch and burrow into the flesh of the host chick. Larvae tend to live in the head region, typically around the nasal cavity and ears, but sometimes on the wings (Sabrosky et al. 1989). Depending on where the larvae enter the bird, they can cause no permanent damage or can lead to the death of the host (Sabrosky et al. 1989). This Holarctic species is widespread in North America but, as is true for other parasitic species, it is rarely collected.

Return to key

Protocalliphora Hough

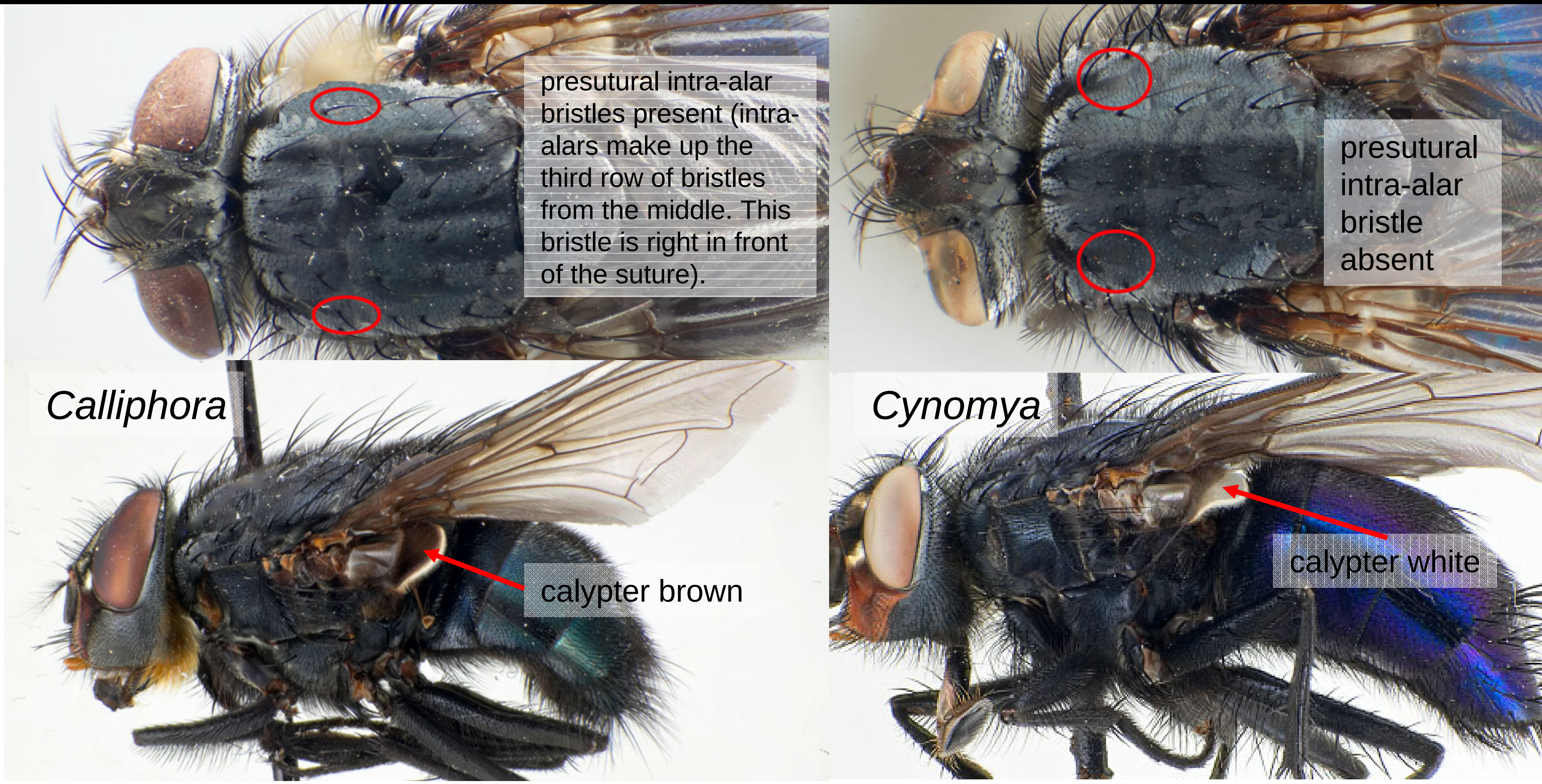
Species of this genus, larvae of which are obligate blood-sucking parasites of bird nestlings, are distinguished from the similar *Trypocalliphora braueri* by the presence of only two large bristles on the notopleuron. Technical keys for the species of this genus are provided by Sabrosky et al. (1989) and Whitworth (2006); **these rarely encountered flies are not keyed further here because of the difficulty of distinguishing species on the basis of external morphology.** See also the bird blowfly website at http://www.birdblowfly.com/index.html





Return to key

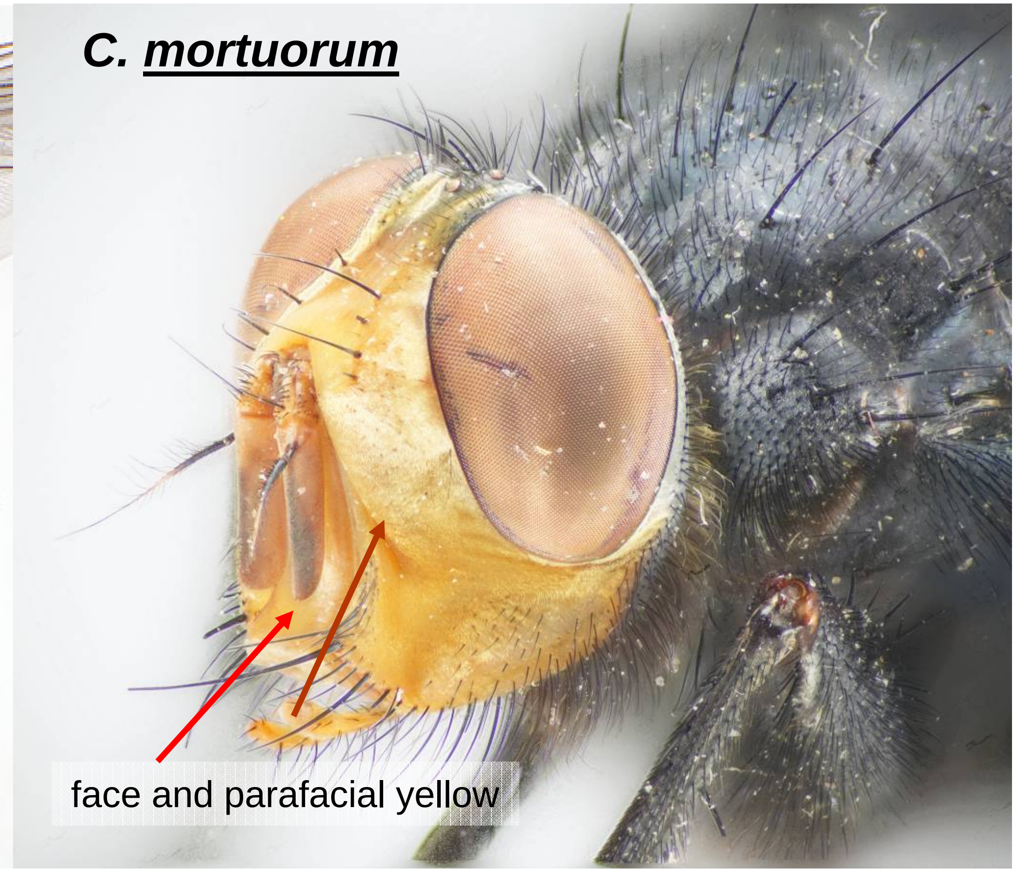
KEY TO THE CALLIPHORINAE OF EASTERN CANADA



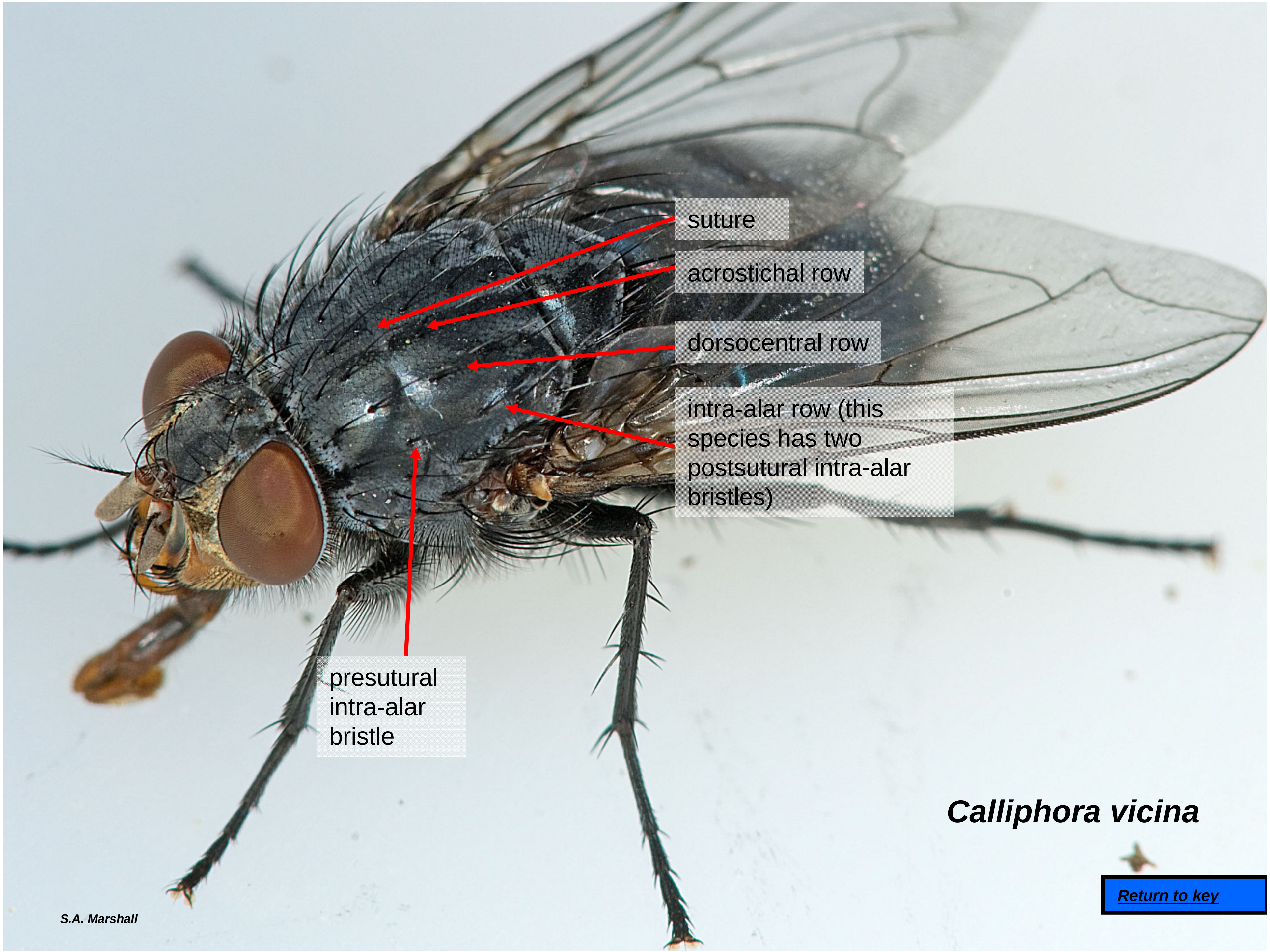
1	Presutural intra-alar bristles present. Calypters usually brown except along margin (two northern species with white calypters are recorded from northern Quebec).	*Calliphora*
-	Presutural intra-alar bristles absent. Calypters entirely whitish.	*Cynomya*

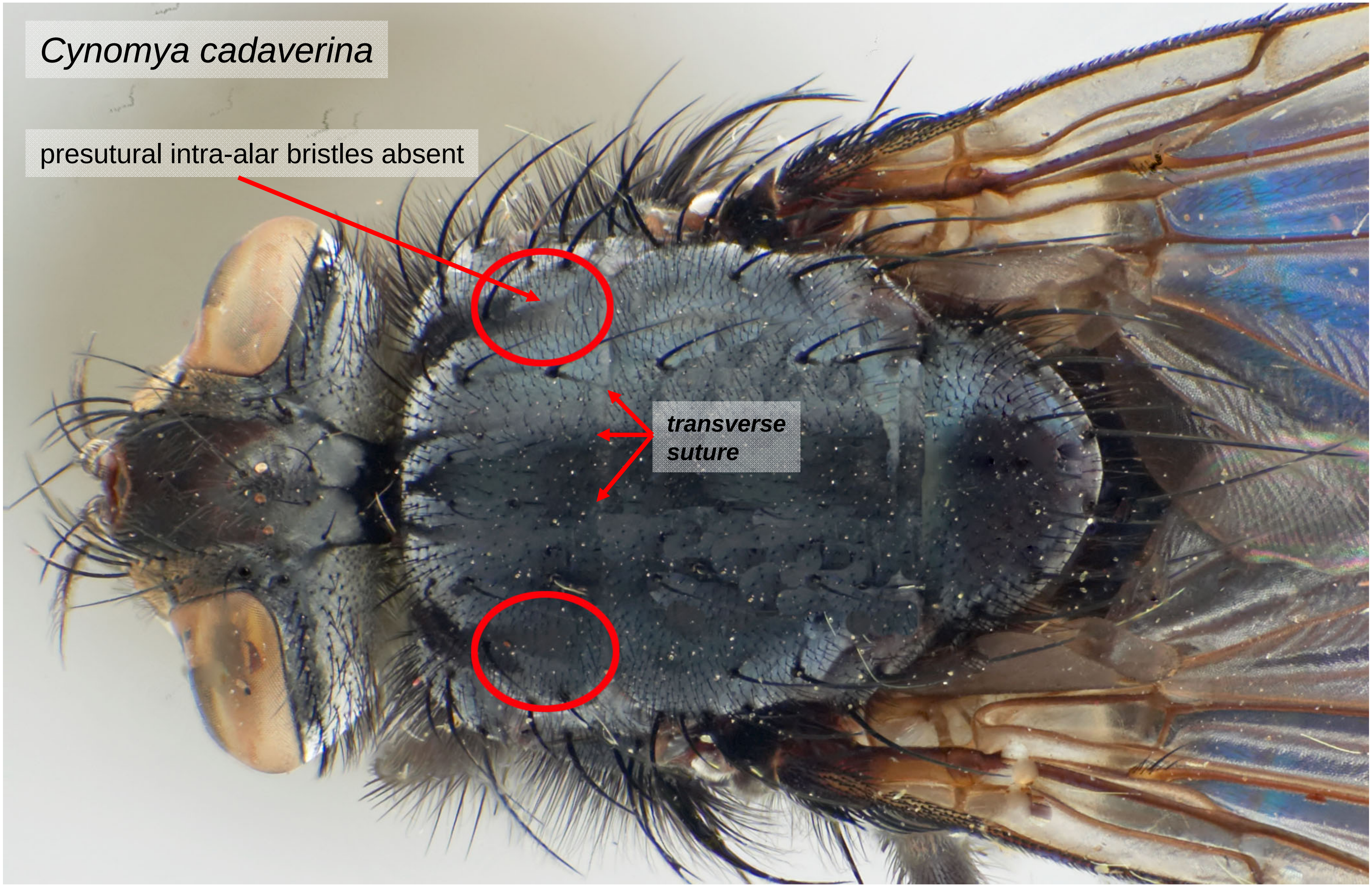
KEY TO THE SPECIES OF *CYNOMYA* OF EASTERN CANADA





1	Face with golden microtomentum but not bright yellow; parafacial reddish to black in ground color with yellowish tomentum when viewed from above. A common and widespread species	*cadaverina*
-	Face bright yellow; parafacial bright yellow to orange A rare Holarctic species, found only north of the Arctic Circle.	*mortuorum*


suture
acrostichal row
dorsocentral row
intra-alar row (this species has two postsutural intra-alar bristles)
presutural intra-alar bristle
Calliphora vicina
Return to key
S.A. Marshall



Return to key

Cynomya mortuorum (Linnaeus)

Cynomya mortuorum (Linnaeus) is distinctive for its bright yellow face, parafacial and genal dilation. This is a northern Holarctic species, known in North America only from a relatively few northern specimens.



Return to key

Cynomya cadaverina Robineau-Desvoidy

Go to map





A large, slow-flying species, *Cynomya cadaverina* occurs throughout North America and is common on excrement and carrion. This species is often attracted to carrion and other materials that are in the most advanced stages of decay, and has been known to cause myiasis in older wounds. Adults are most often found on the wing in the spring and autumn. *Cynomya cadaverina* is distinguishable from *Calliphora* species by the absence of pre-sutural intra-alar bristles. Note that *Calliphora grahami*, a western species, shares this character.

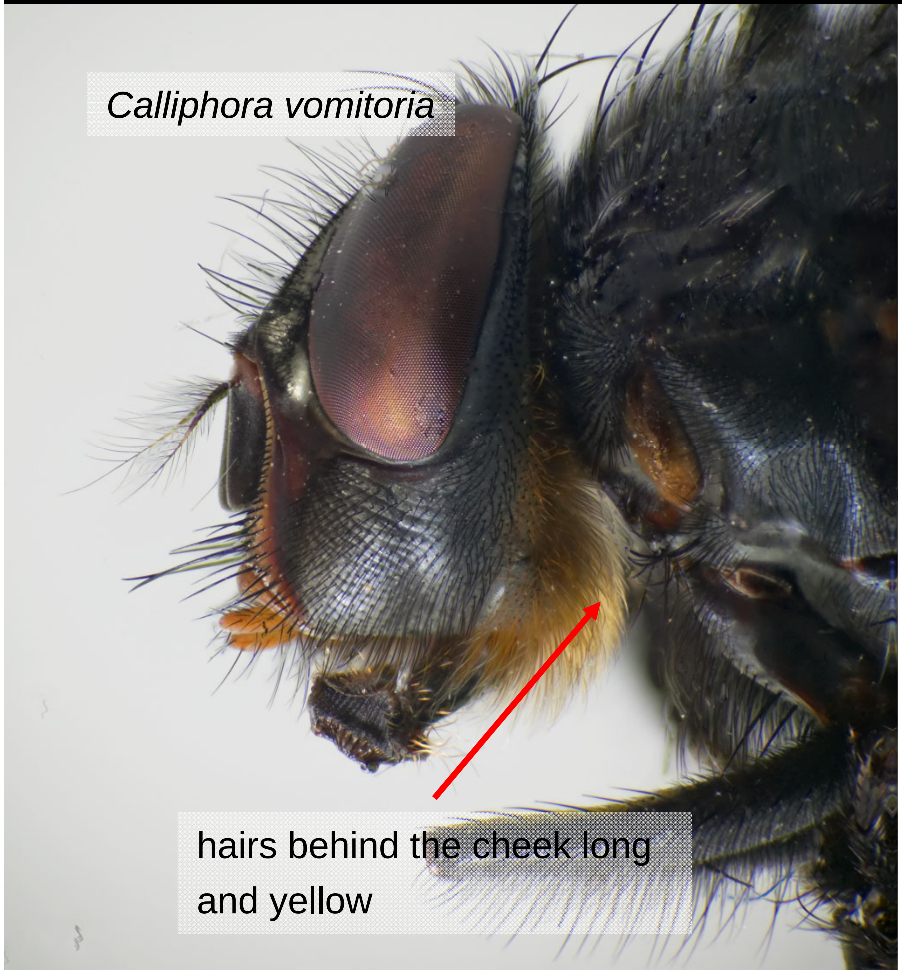
Return to key

Cynomya cadaverina



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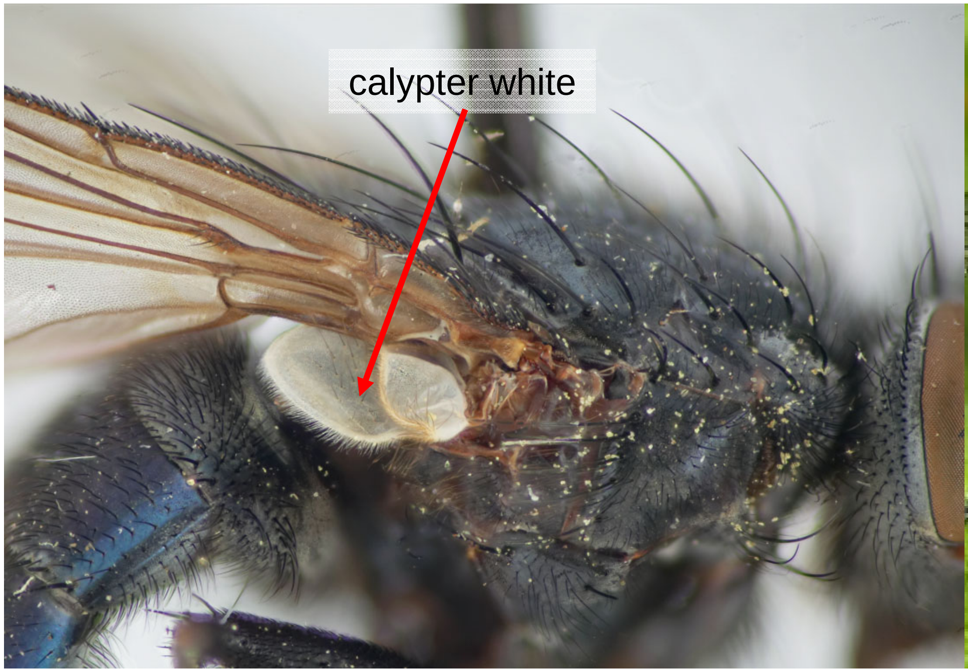
KEY TO THE SPECIES OF *CALLIPHORA* IN EASTERN CANADA

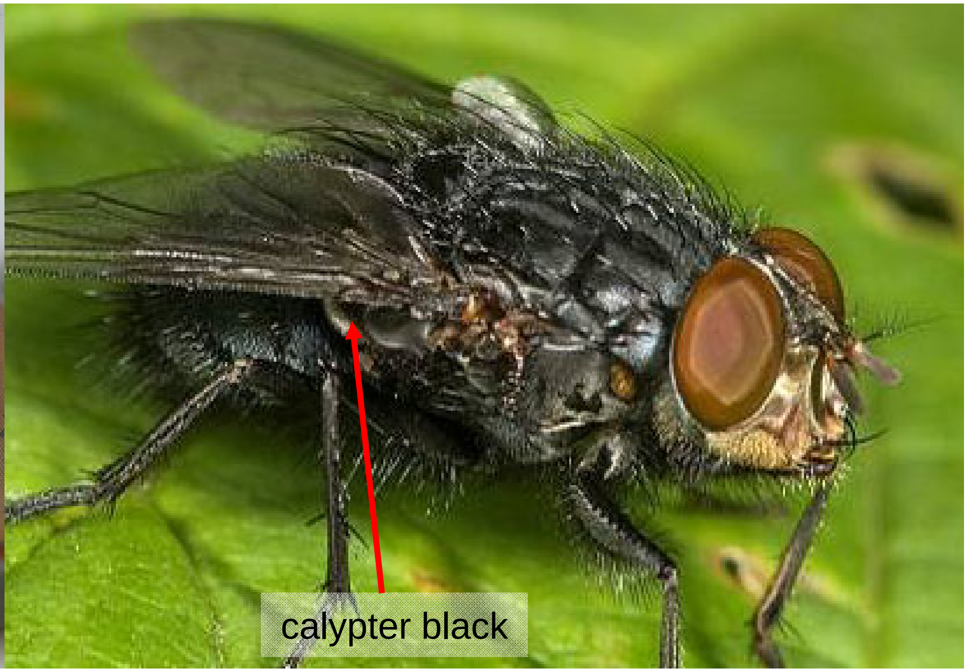




1	Hairs on posteroventral side of the head (behind the cheek) long and yellow. Basicosta black. Very common.	*vomitoria*
-	Hairs on posteroventral side of head (immediately behind the cheek) short and dark in color (not yellow, but some species have pale hairs on the back of the head). Basicosta black in less common species, brown or yellow in most common species.	2

KEY TO THE SPECIES OF *CALLIPHORA* IN EASTERN CANADA

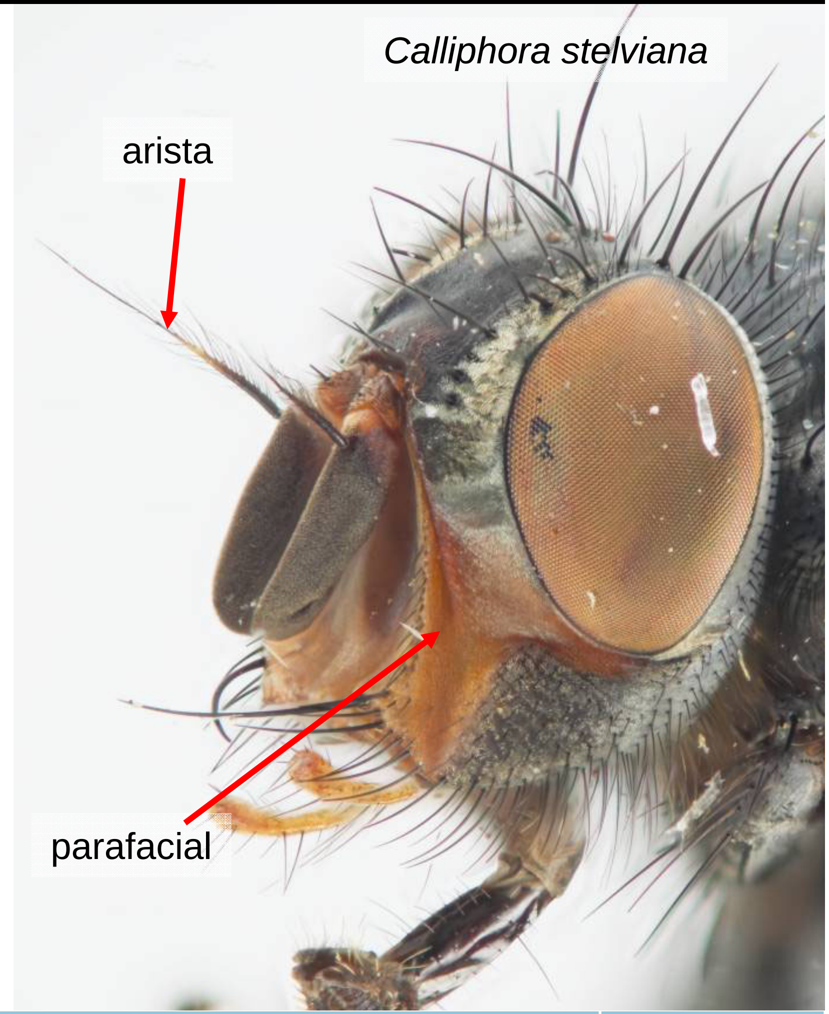




2 (1)	Lower calypter white. Far northern species.	3
-	Lower calypter dark, not white. Widespread species.	4

KEY TO THE SPECIES OF *CALLIPHORA* IN EASTERN CANADA





3 (2)	Arista with conspicuous hairs only on upper surface, hairs on lower surface very short. Parafacial dark brown.	*genarum*
-	Arista with conspicuous long hairs on both upper and lower surfaces. Parafacial reddish or orange at least on lower half.	*stelviana*

Calliphora genarum (**Zetterstedt)**

Calliphora genarum is a northern species known from Alaska to northern Quebec and Labrador. The combination of white calypters and a dark brown parafacial distinguish this species from all eastern North American congeners.



Calliphora stelviana (Brauer & Bergenstamm)

Go to map

Calliphora stelviana is a northern and montane species known from Alaska, northern Quebec and high altitudes in Colorado. The combination of white calypters and a mostly orange parafacial distinguishes this species from all eastern North American congeners.

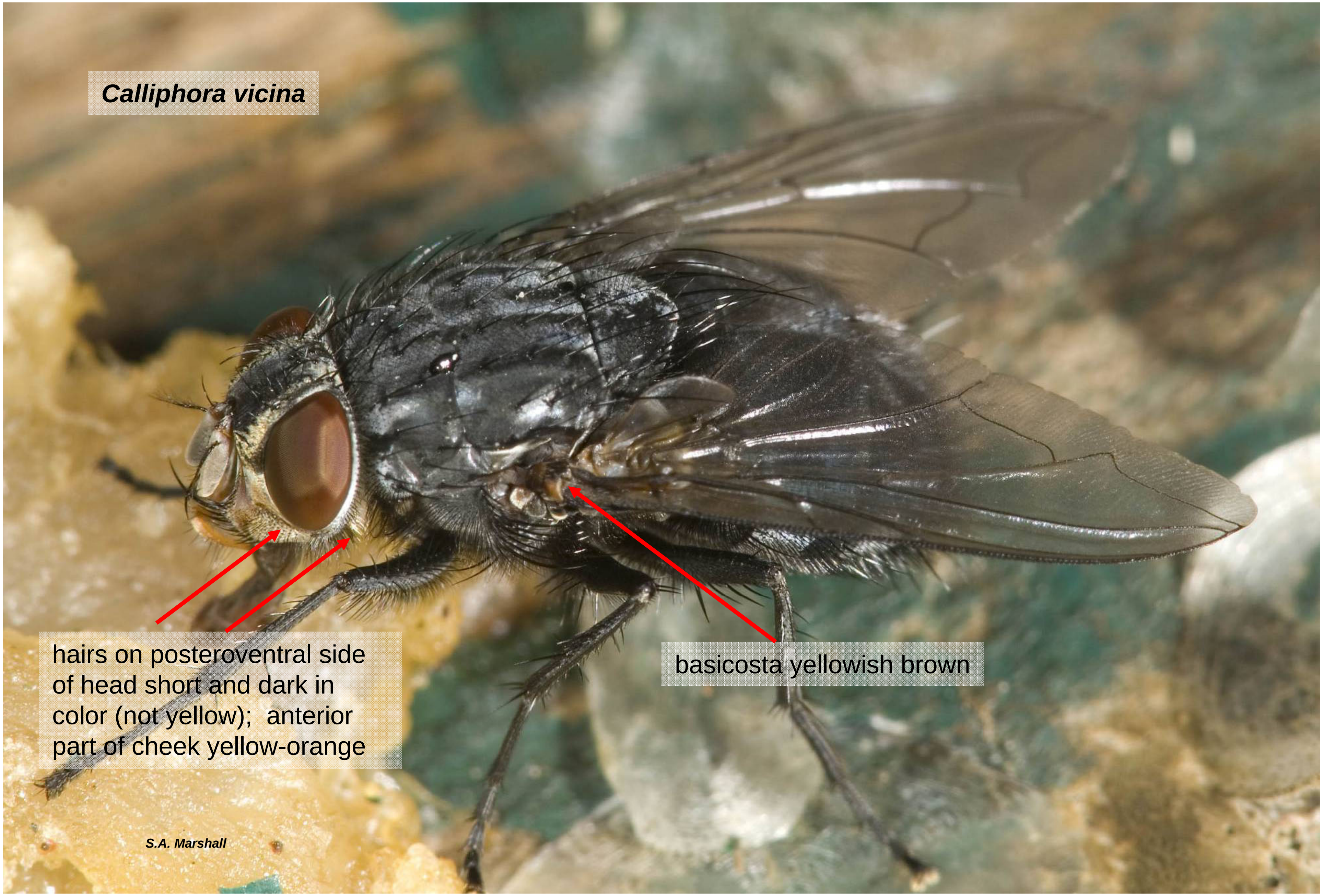


Return to key

Calliphora stelviana



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Return to key



Calliphora vomitoria (Linnaeus)

Go to map

This common species, easily distinguished from other *Calliphora* by the **long yellow hairs on the posteroventral side of the head**, is widespread in North America. Adults can be found on the wing from spring until autumn.





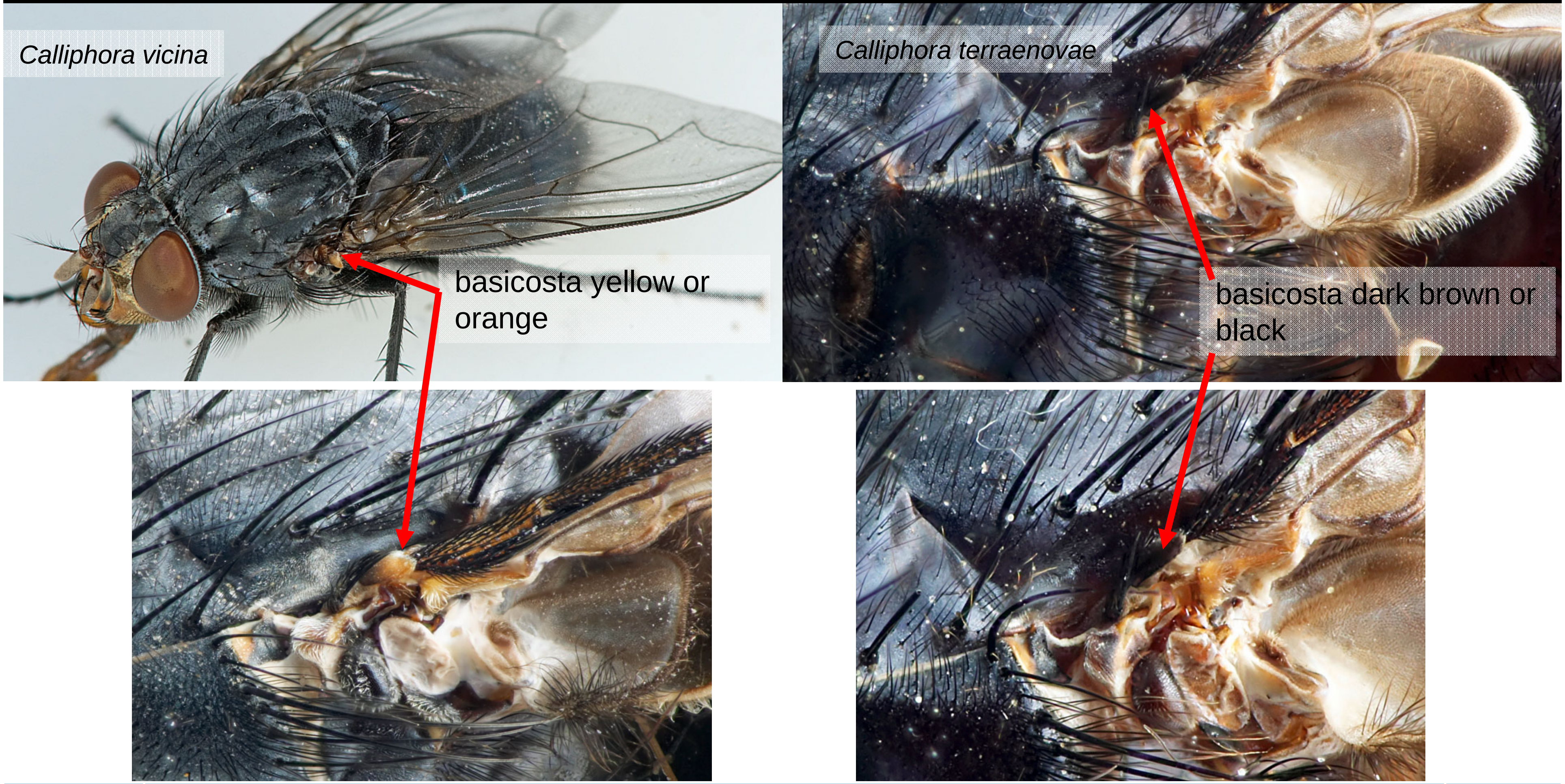
Return to key

Calliphora vomitoria



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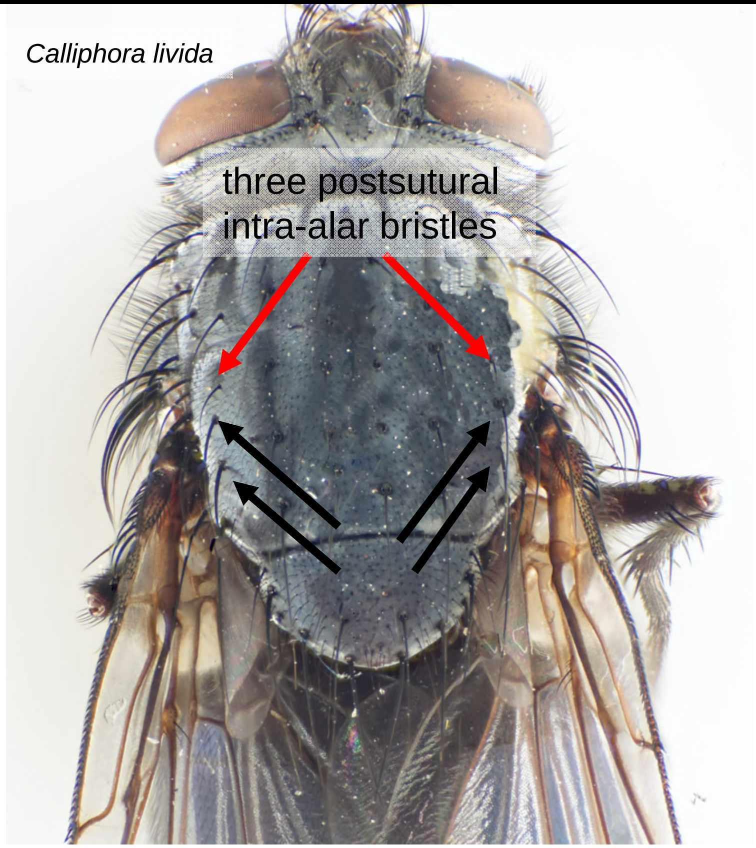
KEY TO THE CALLIPHORA OF EASTERN CANADA

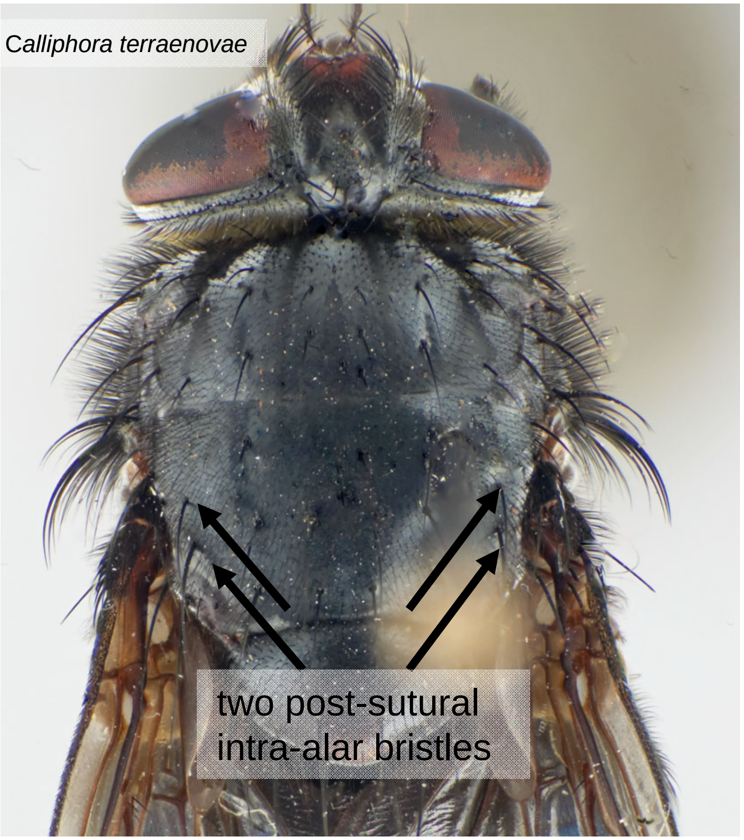


4 (2)	Basicosta yellow or orange. Front half or more of cheek orange to red.	*vicina*
-	Basicosta dark brown or black. Front half of cheek dark.	5

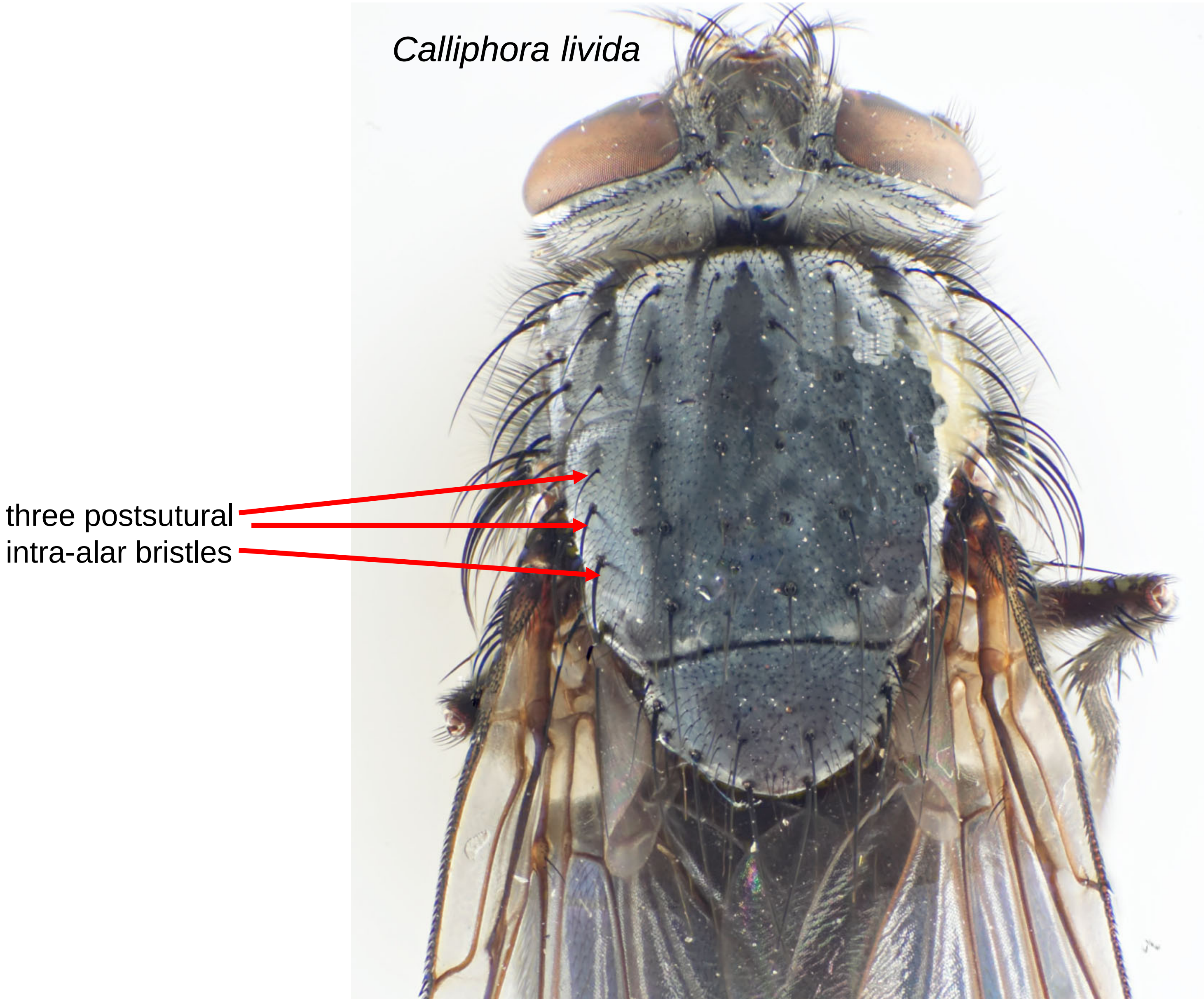
Return to table of contents

KEY TO THE *CALLIPHORA* OF EASTERN CANADA



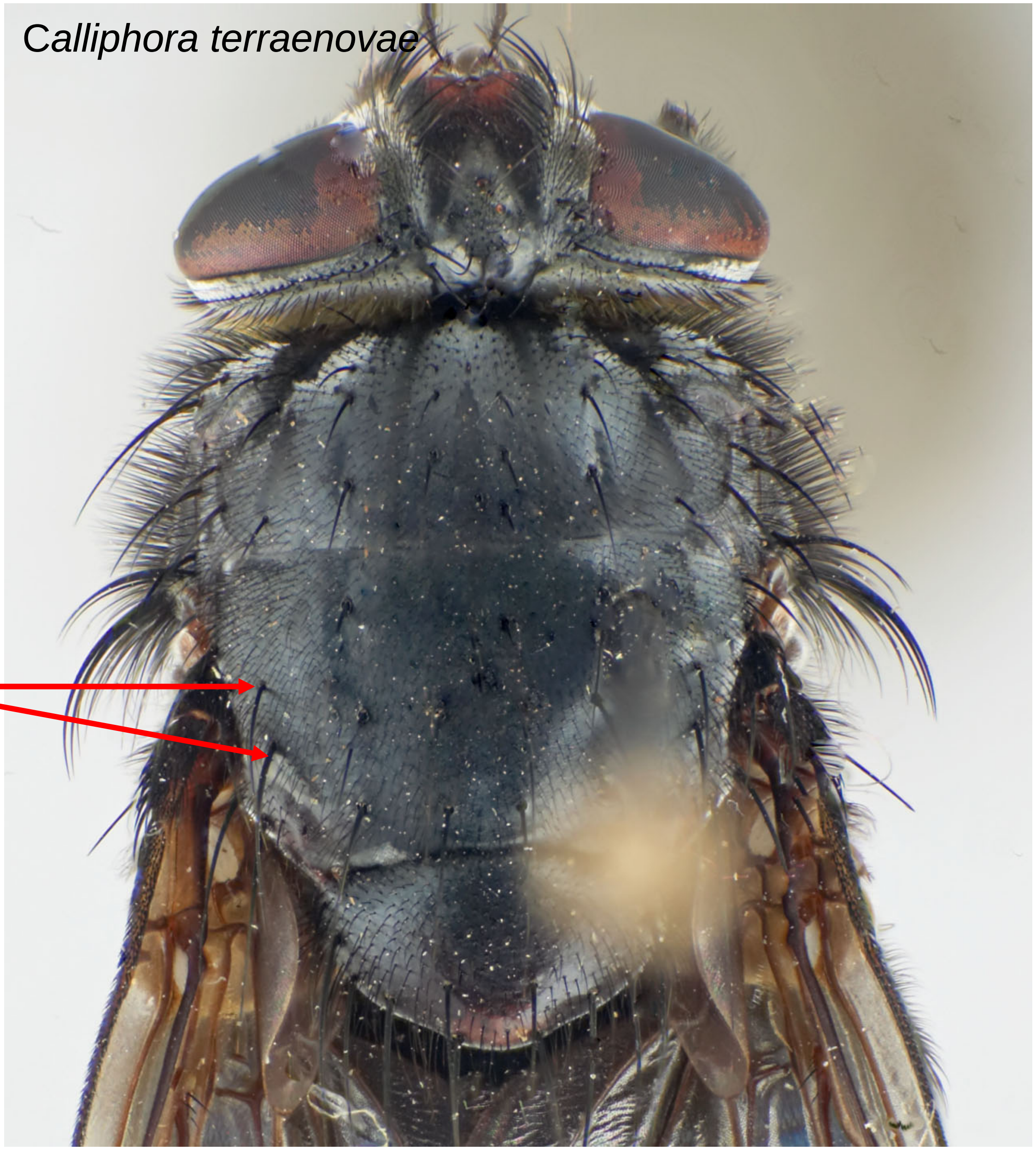


5 (4)	Three postsutural intra-alar bristles.	*lividа*
-	Two postsutural intra-alar bristles.	6



Return to Chrysominae key
Return to Calliphorinae key

two postsutural acrostichal bristles



Return to Chrysominae key

Return to Calliphorinae key

Go to map

Calliphora livida Hall

Calliphora livida is the only eastern Canadian *Calliphora* to have three postsutural intra-alar bristles. This is a widespread species, common on carrion throughout North America, with adults most common during the early spring months and late fall.





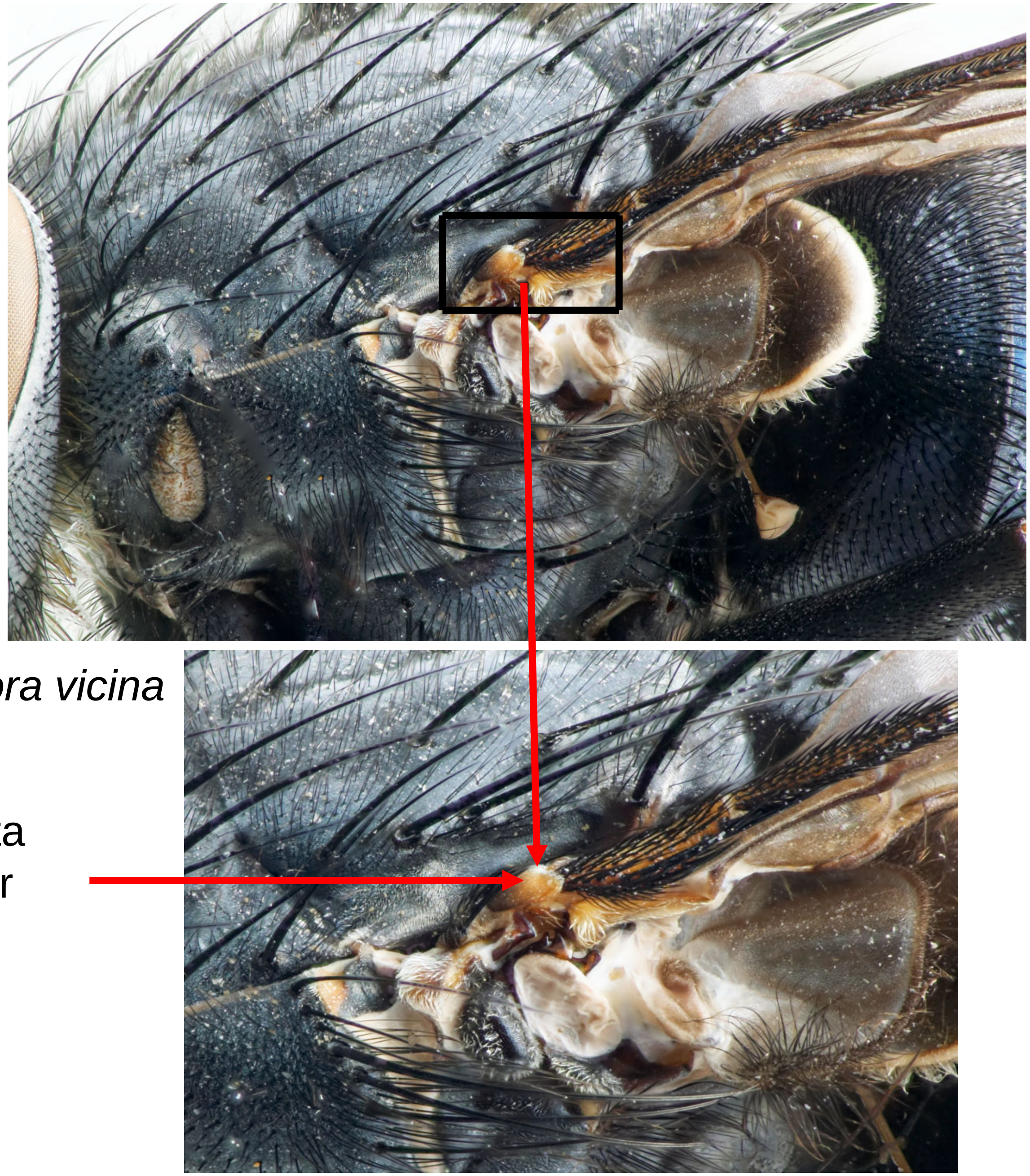
Return to key

Calliphora livida



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doi: 10.3752/cjai.2011.11



Calliphora vicina

basicosta yellow or orange

Return to key

Calliphora terraenovae



Return to key

Go to map

Calliphora vicina Robineau-Desvoidy

This species can be distinguished from the similar *Calliphora terraenovae* and C. *montana* by its yellowish basicosta. *Calliphora vicina* is widespread and common in North America, developing in various types of carrion throughout the season.







Return to key

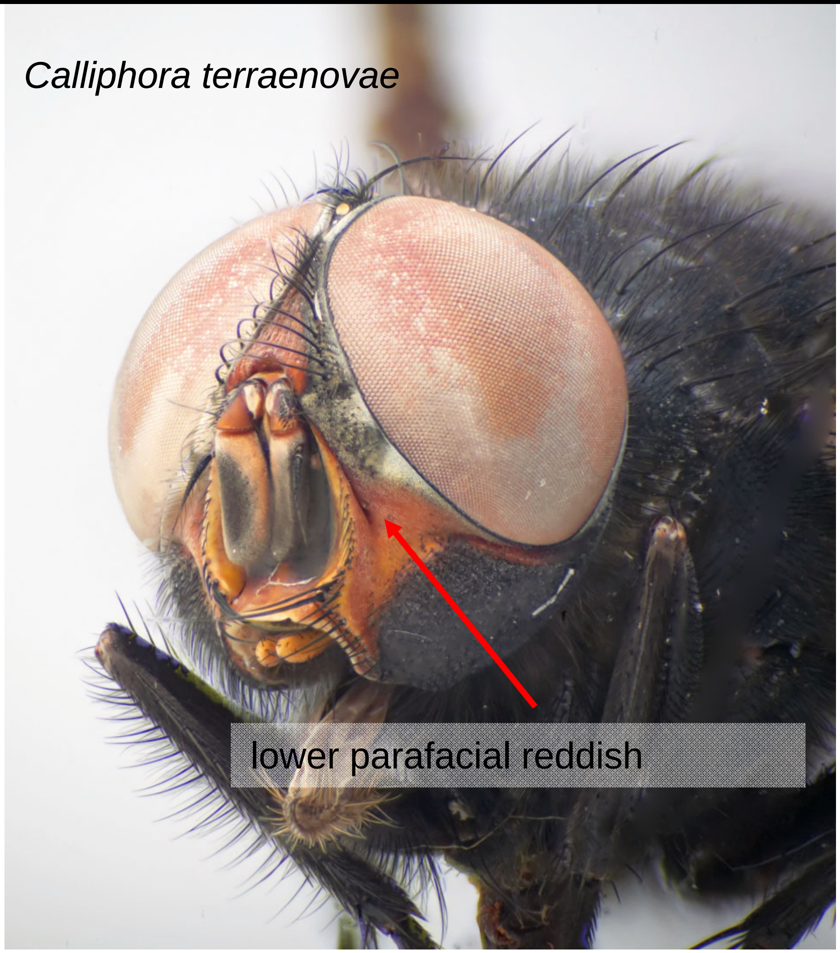
Calliphora vicina



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doi: 10.3752/cjai.2011.11

KEY TO THE *CALLIPHORA* OF EASTERN CANADA





6 (5)	Lower parafacial (and usually genal groove) reddish, not black (parafacial golden or silvery tan when viewed from above). Front part of genal dilation also usually reddish, especially when viewed from above.	*terraenovae*
-	Parafacial silvery black; genal groove entirely black.	7

Go to map

Calliphora terraenovae Macquart



Calliphora terraenovae is similar to *C. vicina* but has a **black basicosta**. It differs from *C. montana* in having a **reddish-orange (as opposed to black parafacial)**. This relatively uncommon species is widespread in North America south to California and Florida, and flies relatively late in the season.





Return to key

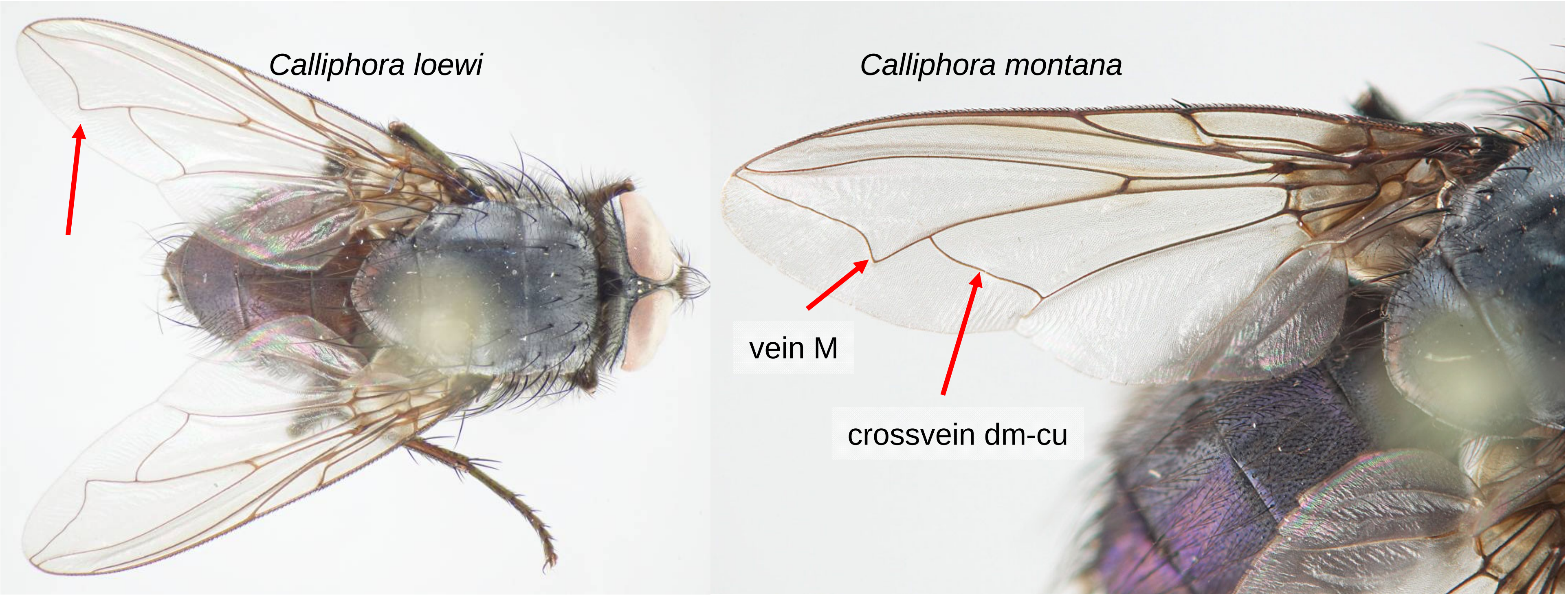
doi: 10.3752/cjai.2011.11

Calliphora terraenovae



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KEY TO THE *CALLIPHORA* OF EASTERN CANADA



7 (6)	Bend in vein M much closer to wing margin than crossvein dm-cu. Posterior 1/3-1/2 of tergite 5 of females with an incision.	*loewi*
-	Bend in vein M about equidistant between wing margin and crossvein dm-cu. Posterior 1/3-1/2 of female tergite 5 without an incision.	*montana*



Apex of female abdomen, *C. loewi,* to show incision

Return to key

Go to map

Calliphora loewi Enderlein



Calliphora loewi is a rarely collected northern Holarctic species previously known in North America only from the Yukon, Alaska and British Columbia. We here record the species from eastern North America for the first time, based on one male taken in yellow pan traps in northern Quebec. Genitalia, as illustrated in Whitworth (2006) are distinctive, and the species can be separated from the similar *C. montana* by the wing venation in which the bend in M is relatively close to the wing margin.

Return to key

Calliphora loewi



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Go to map

Calliphora montana Shannon



Calliphora montana differs from most other eastern Canadian *Calliphora* in having both the basicosta and parafacial black. The rarely collected northern species *C. loewi* (here newly recorded from eastern North America) is similar, but can be distinguished by the wing venation and distinctive male genitalia (as figured by Whitworth, 2006) . *Calliphora montana is* relatively uncommon but widespread in Canada east of the Rockies.

Return to key

doi: 10.3752/cjai.2011.11

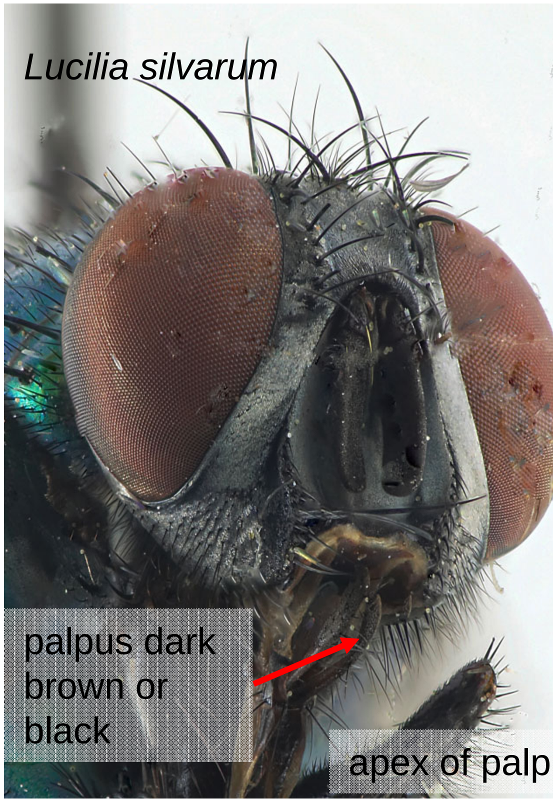
Calliphora montana



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doi: 10.3752/cjai.2011.11

KEY TO THE EASTERN CANADIAN SPECIES OF *LUCILIA*

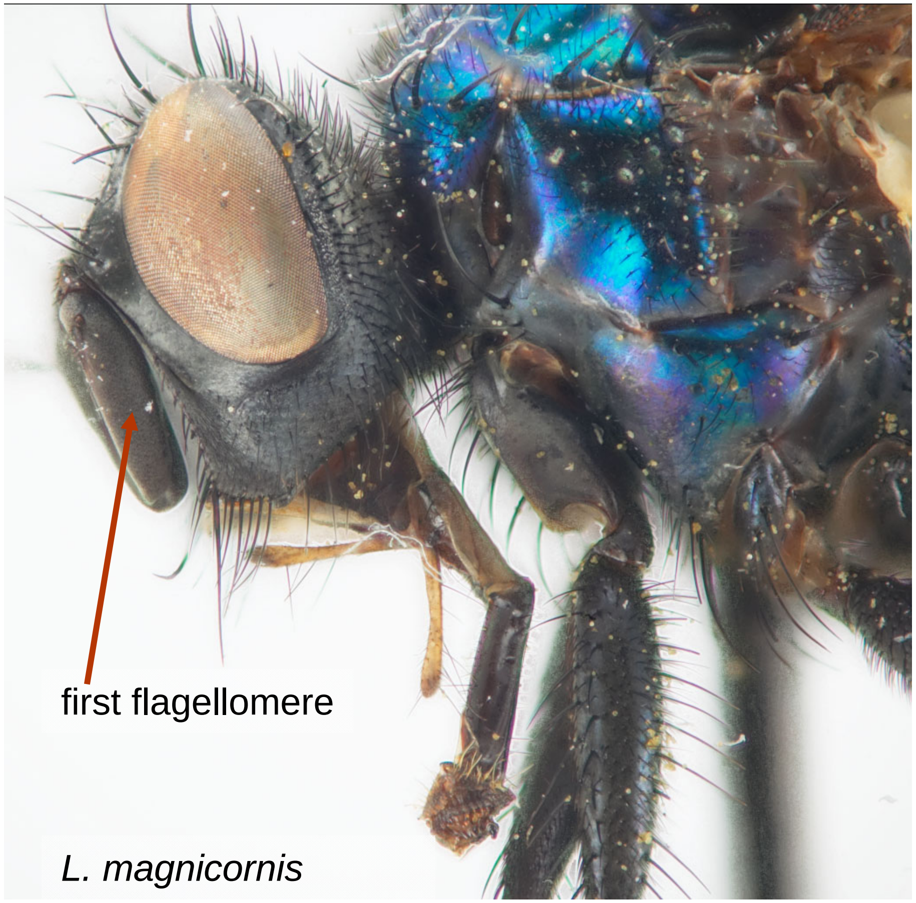






1	Palpus entirely or partly dark brown or black (sometimes only apex black in one northern species). Basicosta black and thorax with 3 postsutural acrostichal bristles. Second visible abdominal tergite (tergite 3) with one or two pairs of large median marginal bristles.	2
-	Palpus entirely orange or yellow, not dark apically. If basicosta black then thorax with only 2 postsutural acrostichal bristles. Abdominal tergite 3 with uniformly small marginal bristles.	3

KEY TO THE EASTERN CANADIAN SPECIES OF *LUCILIA*



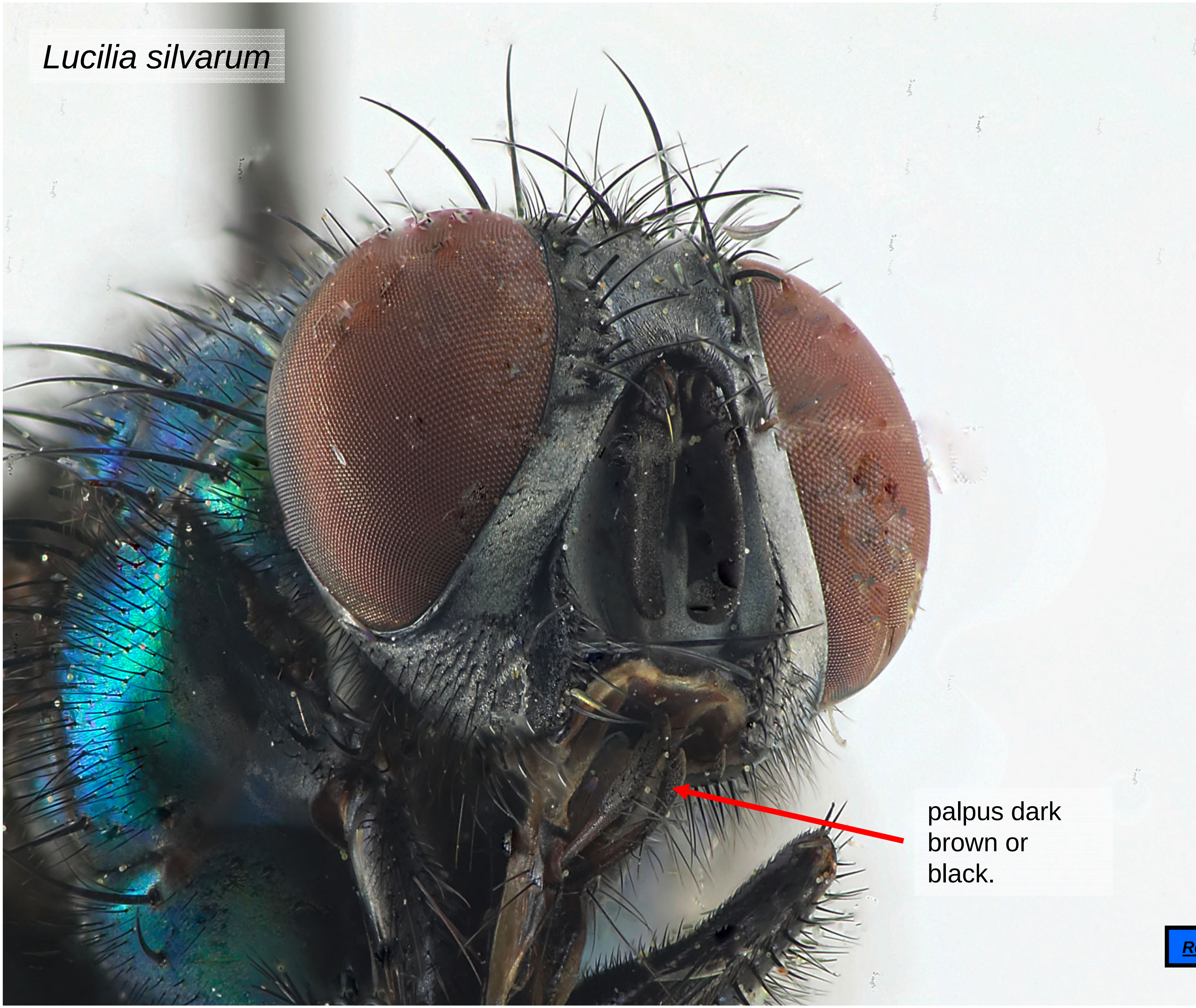


2 (1)	Two postsutural intra-alar bristles. First flagellomere less than half eye height. A common and widespread species.	*silvarum*
-	Three postsutural intra-alar bristles, anterior one weak. First flagellomere long, longer than half eye height. This rare northern species is recorded from Alaska to Labrador but not known from Ontario,	*magnicornis*

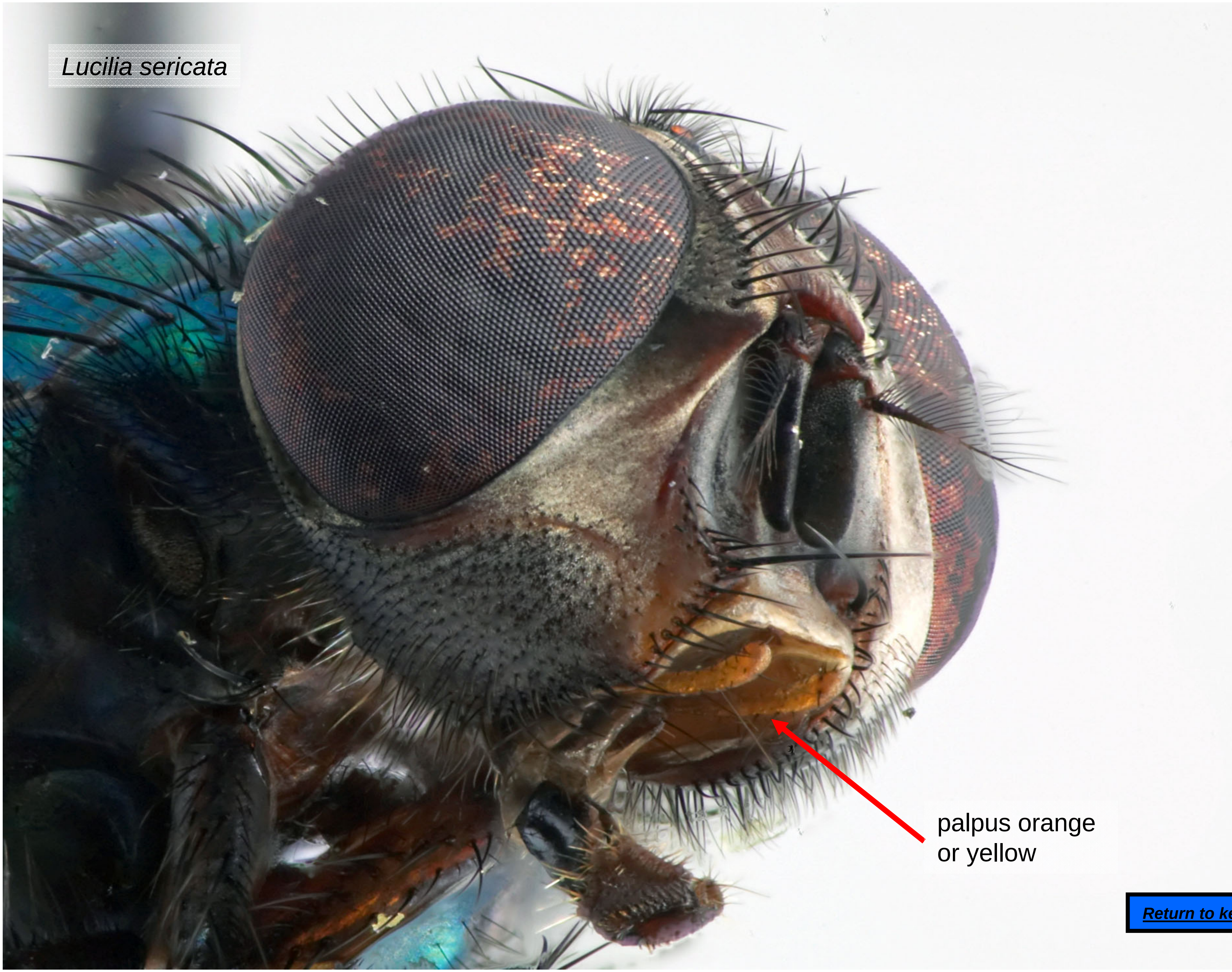
Lucilia magnicornis (Siebke)

Lucilia magnicornis is a rarely collected northern species, recorded from Alaska to Labrador but not known from Ontario. It can be distinguished from the widespread and common *L. silvarum* in having 3 postsutural intra-alar bristles (with a small anterior one not present in *silvarum*), its long first flagellomere, and relatively short aristal hairs.

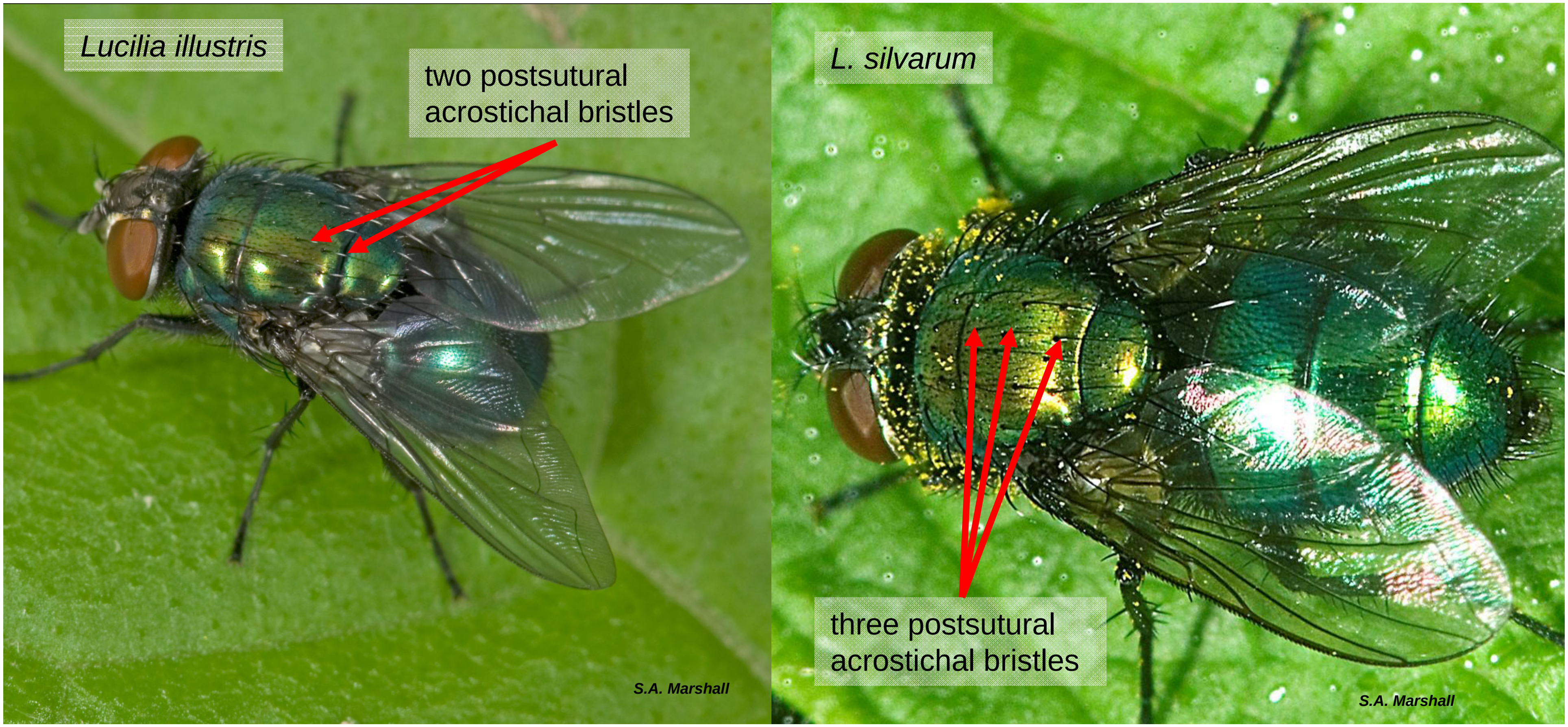




Return to key



Return to key

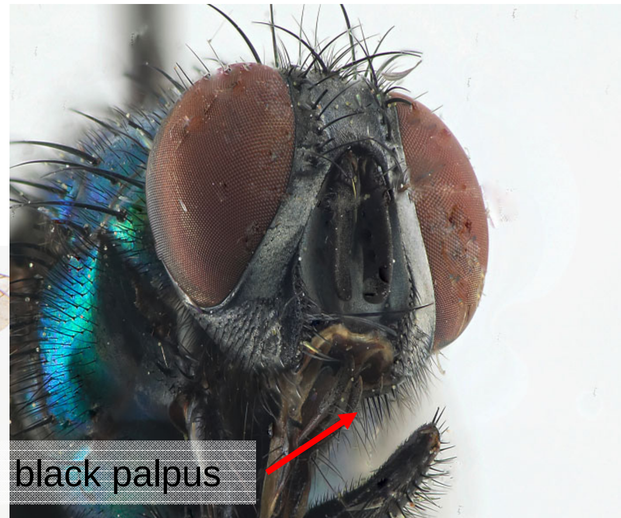


Return to key

Go to map

Lucilia silvarum (Meigen)







Lucilia silvarum, a regular carrion visitor that often develops as a parasite of frogs and related amphibians, can be distinguished from other common northeastern *Lucilia* by its **black (not orange or yellow) palpus.** Although this species also develops in carrion, females often deposit eggs on the backs of frogs, where they hatch into larvae that migrate towards the head. After burrowing into the head, the larvae consume the interior of the nasal cavity and eyes. Hosts are normally killed within 1-2 weeks. Adult flies occur from spring to early autumn. *Lucilia silvarum* is a Holarctic species common throughout the northern United States and southern Canada.

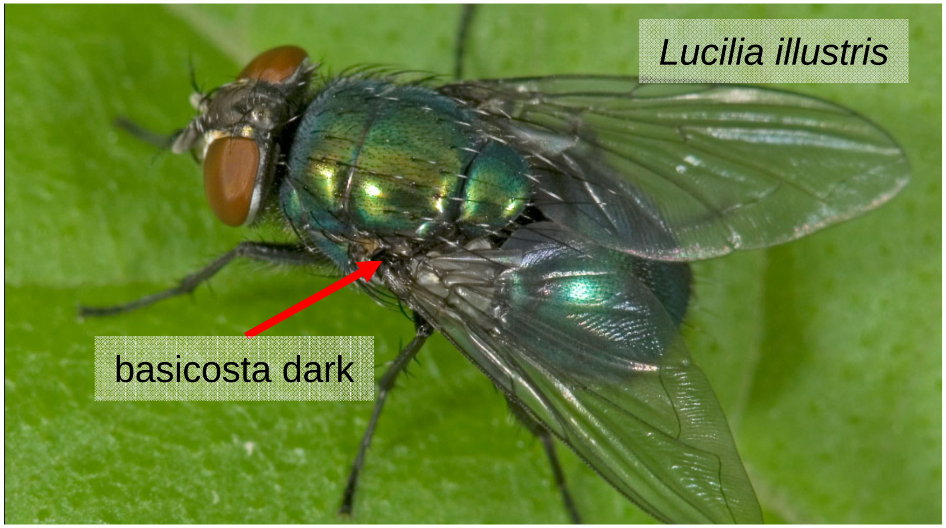
Return to key

Lucilia silvarum



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KEY TO THE EASTERN CANADIAN SPECIES OF *LUCILIA*









3 (1)	Basicosta dark brown or black. Subcostal sclerite (on ventral side of wing) with stout black bristles (sometimes reduced or hard to see). Two pairs of postsutural acrostichal bristles.	*illustris*
-	Basicosta yellow or orange. Subcostal sclerite bare or with fine pubescence only. Two or three pairs of postsutural acrostichal bristles.	4



Return to key

Go to map

Lucilia illustris (Meigen)

Lucilia illustris can be distinguished from other *Lucilia* by the **black bristles on the subcostal sclerite**. Adults of this common Holarctic species occur from spring to autumn in the northern United States and southern Canada.





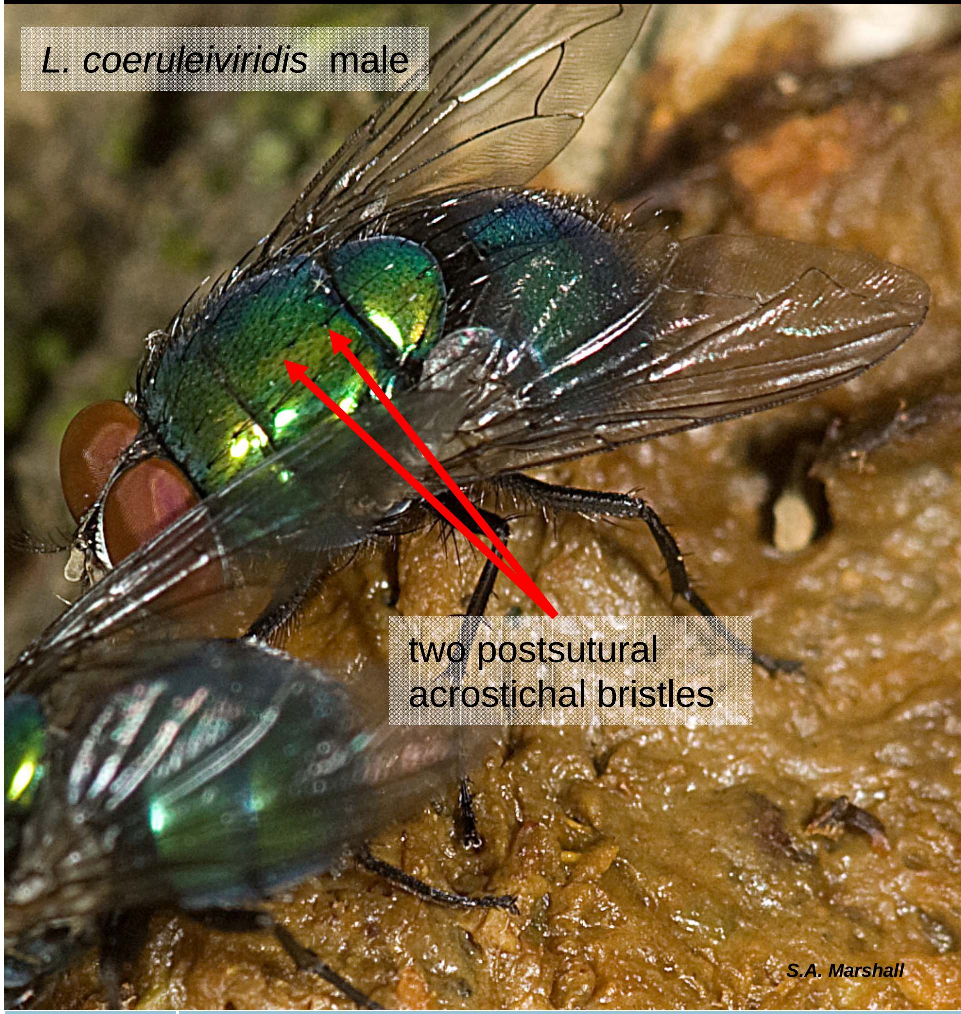
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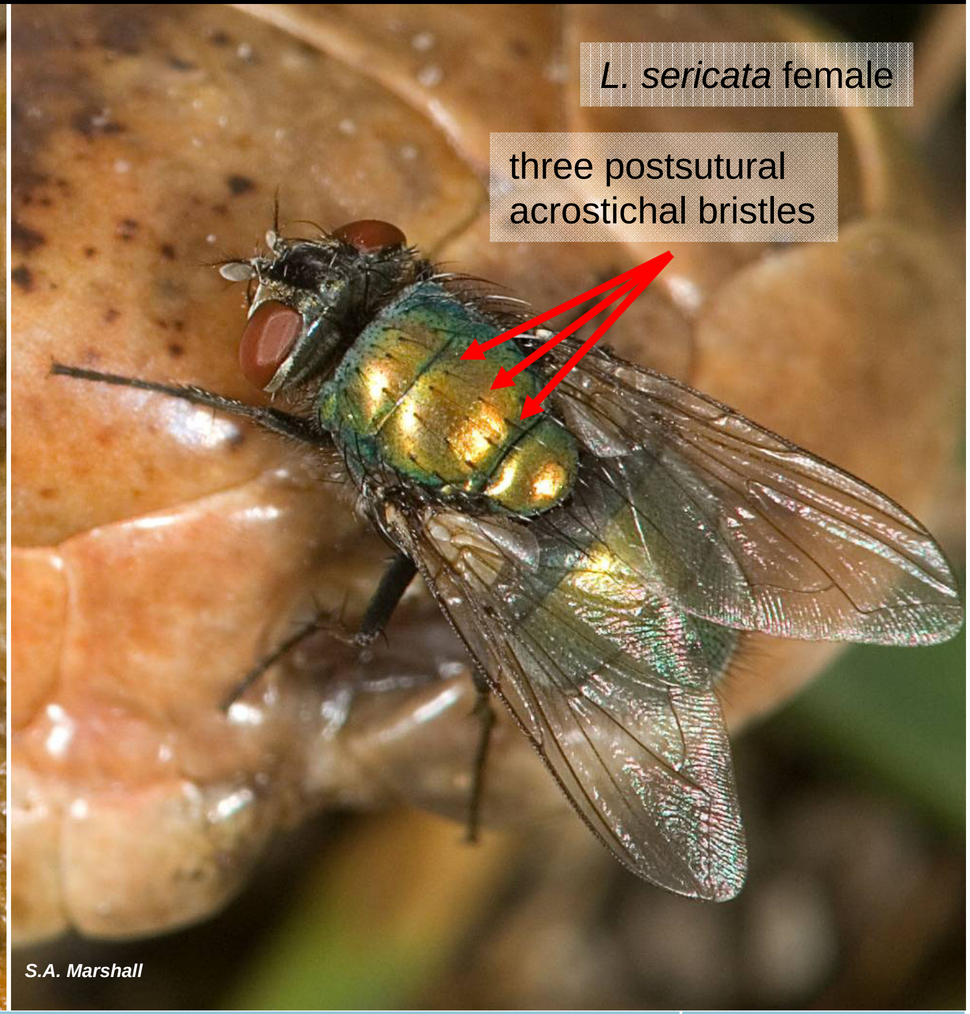
Lucilia illustris



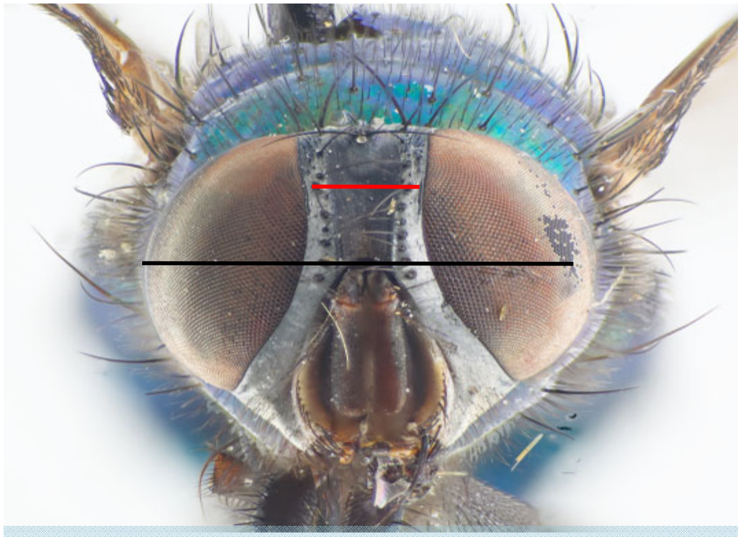
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KEY TO THE EASTERN CANADIAN SPECIES OF *LUCILIA*





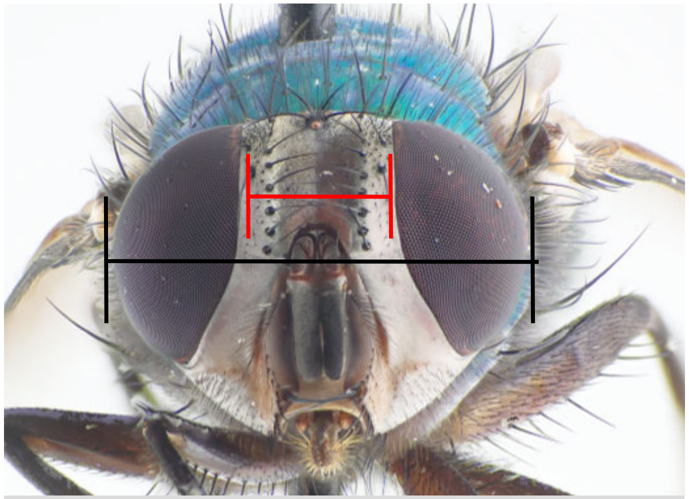
4 (3)	Two postsutural acrostichal bristles. Male frons narrower than the first flagellomere so eyes almost touch. Females with frons ¼ or less the width of the head at narrowest point.	*coeruleiviridis*
-	Three postsutural acrostichal bristles. Male frons wider than the first flagellomere so eyes distinctly separated. Frons of female 1/3 of head width or wider at their narrowest point.	*sericata*



Frons of female *L. coeruleivirdis* less than ¼ the width of the head



Frons of male *L. coeruleiviridis* narrower than first flagellomere; eyes appear to almost be touching



Frons of female *L. sericata* more than 1/3 the width of the head



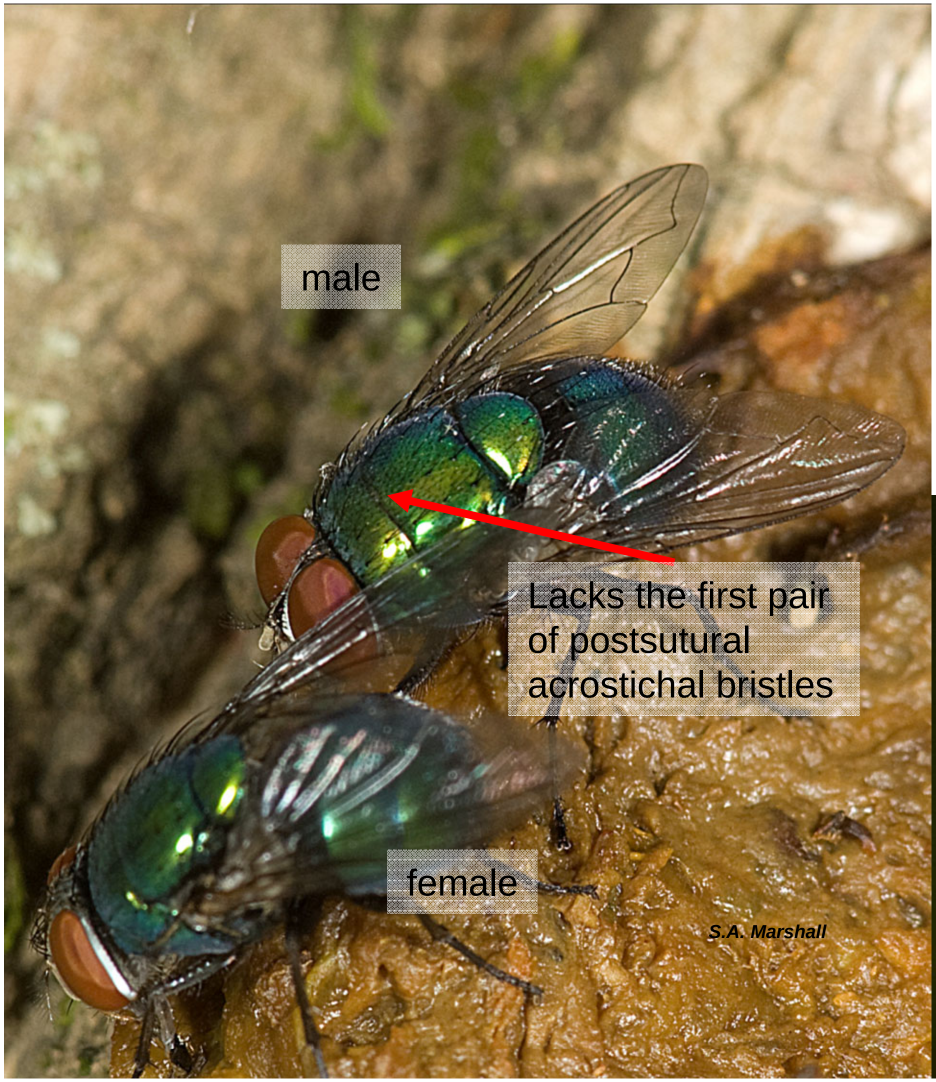
Frons of male *L. sericata* wider than first flagellomere; eyes obviously separated

Return to key

Go to map

Lucilia coeruleiviridis Macquart

Lucilia coeruleiviridis is very similar to *L. sericata*, but has a narrower frons and **lacks the first pair of postsutural acrostichal bristles** (and thus has 2 rather than 3 pairs). This is an eastern North American species, here recorded from Canada for the first time. Adults occur from spring until the beginning of fall. Like other *Lucilia* species, *L. coeruleiviridis* varies widely in colour, from green or blue to bronze.





Return to key

Lucilia coeruleiviridis

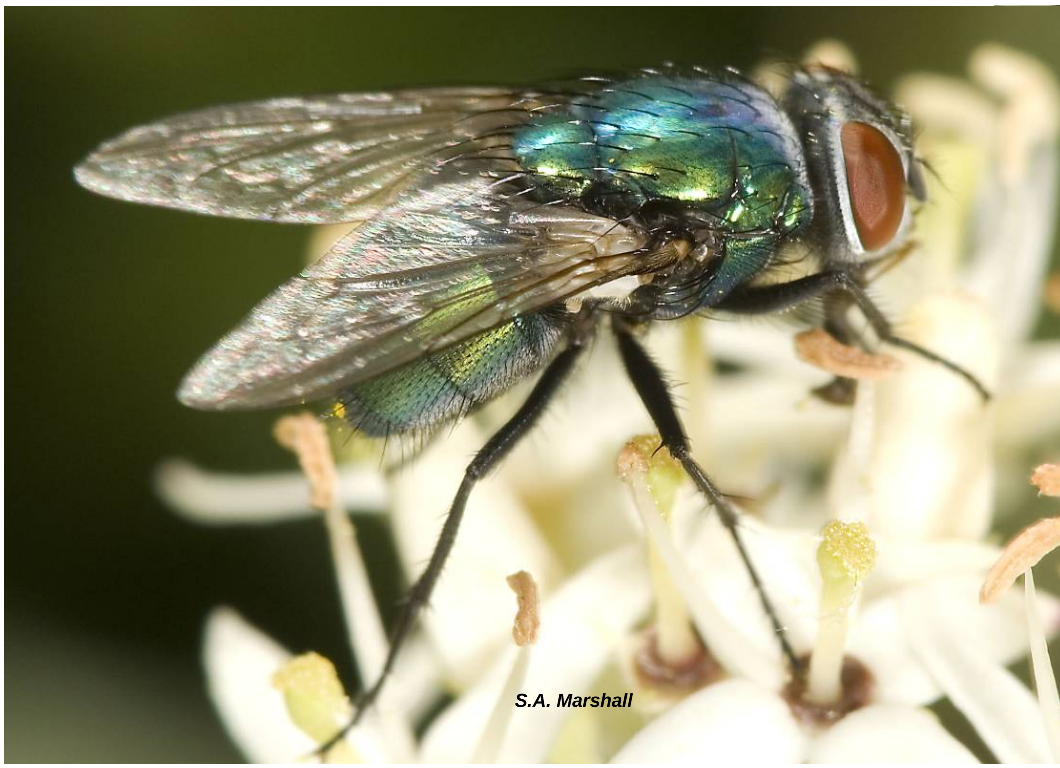


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Go to map

Lucilia sericata (Meigen)

Lucilia sericata is a cosmopolitan, synanthropic species common throughout the United States and southern Canada. It can be distinguished from the similar *L. coeruleiviridis* by its three pairs of postsutural acrostichal bristles, and from other *Lucilia* species by the combination of a yellow palpus and a yellowish basicosta.





Return to key

Lucilia sericata



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